Lesson 2: Romeo and Juliet: In Rapturous Oscillation?

Overview

This simulation allows students to explore relationship dynamics through the lens of Shakespeare's characters—Romeo and Juliet. Romeo and Juliet are put into a new context in which their feelings oscillate from love on one extreme to hate on the other. Students can change settings, run the simulation, and compare results. By changing the settings, a variety of behaviors are generated.

Learning Goals:

- Represent, interpret, and compare data on a graph.
- Explain concepts including oscillation, contrarian, follower.
- Describe the system's interdependent relationships, connecting this particular oscillating structure to other types of relationships.

Figure 1: Title Screen

Student Challenge

Create a variety of simulated, oscillating relationships. Explain each relationship within the context of the simulation as well as within real world situations.

Lesson 2 – Level C – Ages 13+
Time: 2-3 periods

Materials:

- One computer for every 2-3 students
- Simulation online at http://www.clexchange.org/curriculum/complexsystems/oscillation/Oscillation_RelationshipsC.asp
- Handouts (See pages 5-15)

Curricular Connections:

- "…examine contemporary patterns of human behavior…as they apply to individuals, societies and cultures."
- Analyze how complex characters (e.g., those with multiple or conflicting motivations) develop over the course of a text, interact with other characters....*

* Common Core Standards

Key system dynamics concepts and insights:

- Relationships between people (or entities) can produce behavior patterns such as oscillation between a leader (or contrarian) and a follower.
- A love-hate relationship between two people can be compared to a physical system such as a spring.

Lesson Details

Preparation:

1. Create groups of two to three students each.
2. Check computers to make sure you can access the online simulation.
3. Copy handouts for each student. See the chart below to determine how many copies of each handout you'll need.

#	Page	Handout	Description	Copies
1	5	Literature Connection (*Optional*)	If students have read Shakespeare's play, *The Tragedy of Romeo and Juliet*, they can graph the character dynamics throughout the story.	Copy single-sided. 1 copy per student
2	6-8	Introduction with Baseline Run	Students get started with the simulation using step-by-step directions. They then set up and record the data from a baseline run for Romeo and Juliet	Copy single-sided. 1 copy per student Copy double-sided. 1 copy per student
3	9-10	Experimental Run	Students explore "What if?" questions, recording their data for each run. A minimum of three runs is recommended.	Copy double-sided. 3+ copies per student, depending on how many runs you'd like students to do.
4	11-13	Debrief	Students step through the debrief and write their reflections.	Copy double-sided. 1 copy per student
5	14-15	Assessment1	Students summarize their learning.	Copy double-sided.
6	16	Assessment 2 (*Optional*)	Students synthesize the simulation results in order to make connections to other types of similar and different social relationships.	Copy single-sided.

4. *Optional*: You may want to read the background information about the underlying structure of the model. This can be useful as you guide students to understanding the model behavior, as it relates to real world behaviors, and the limitations of the model. See, "RomeoJuliet Model Background Info," available as a separate file for download.

Lesson Sequence:

1. (*Optional*) If students have read the play, *The Tragedy of Romeo and Juliet*, students can graph dynamics within the play using Handout 1. They can then compare those trends to the theoretical output of the simulation, which goes beyond the events of Shakespeare's play.

Lesson Details

2. Introduce key vocabulary (e.g., contrarian, fickleness, follower, fatigue, oscillation) as needed.
3. Have students open the simulation and work through the simulation introduction, and experiments using

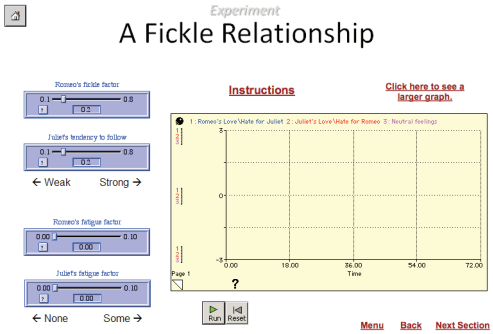


Figure 2: Control Panel

the guided handouts. *Note that the handouts guide students through the simulation in a step-by-step manner. If you'd like to leave the exploration more open, then you may eliminate some of the handouts.* Figure 2 shows the control panel screen.

Debrief and Assessment:

1. Have students use the debrief handouts to reflect on the simulation experience. You can also debrief the simulation experience as a class, using ideas for bringing the lesson home. Assessment 1 on pages 14-15 checks for basic understanding of concepts embedded within the simulation and allows students to make connections to other systems that exhibit similar trends. Assessment 2 on page 16 asks students to compare the simulated results with other real-world relationships.
2. See this and the following page for possible assessment responses.
   - Possible responses for questions 'a.' and 'b.' on Assessment 1, page 14:
     - Question 'a.'—Example story of the graph: As Juliet's love for Romeo rises, Romeo, being

Bringing the Lesson Home:
Discuss these and any other topics that have surfaced.

- What causes a relationship between two people (or entities) to oscillate? Come to a resting point?
- What caused faster oscillations? Slower?
- Analyze the simulation in terms of a tempestuous relationship between a man and a woman. Does the model make sense for that type of relationship? Why or why not?
- Literature connection: Discuss whether you agree or disagree with the following—Romeo and Juliet are kept apart, not by their families, but by "Romeo's fickleness."
- How does the simulation compare to other relationships, e.g., a feud or a conflict between two countries.

Assessment Ideas:

- Have students use the debrief and assessment handouts. The debrief takes students step-by-step through the debrief screens. The assessment allows students to create a connection to another situation.

fickle, starts losing interest. His love falls toward hatred. Juliet also loses interest because Romeo is no longer following. Now, Romeo realizes that Juliet is drifting away and reverses course, pursuing her in love once more. Juliet responds (as the follower) and loves him once again. Eventually, all the graphs reach neutrality, because they grow tired of the ups and downs. In the end, they are ambivalent toward one another.

- Question 'b.'—In order to create this graph, we'd need a low fickle factor, low tendency to follow, and some fatigue. The actual numbers used to produce the graph are also included in the table below.

Romeo's Fickle Factor	Low (0.3)
Juliet's Tendency to Follow	Low (0.3)
Romeo's Fatigue Factor	Some, but not too high (0.4)
Juliet's Fatigue Factor	Some, but not too high (0.4)

- Possible responses for questions 'd.' and 'e.' on Assessment 1, page 15:
  - See Figure 3 for an example map based on transferring the Romeo and Juliet map to another context.
  - One possible "story" for the example map: My little sister and I love each other, but sometimes she drives me nuts. She's always following me around. When my sister wants to hang out with me, I get annoyed, so I don't really want to be around her. She notices and then goes away. When I see that she doesn't want to be with me anymore, I get worried that she really doesn't like me. So, I start asking her to hang out again. She does, and for awhile, it's cool. Then she starts bugging me again, and the whole crazy thing repeats!

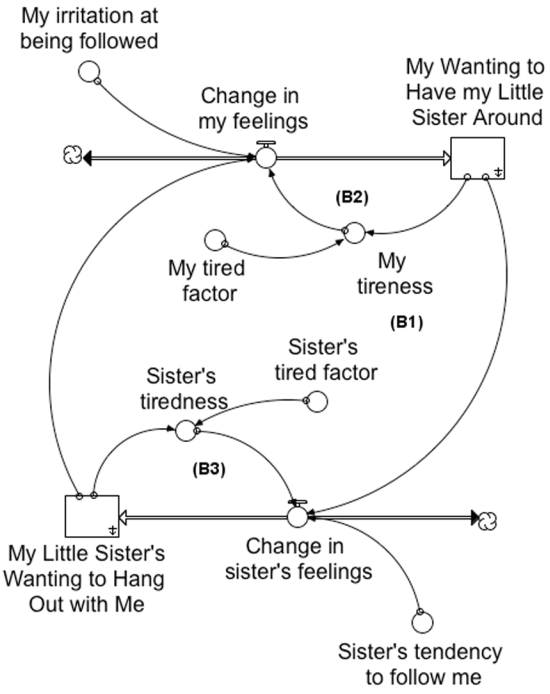
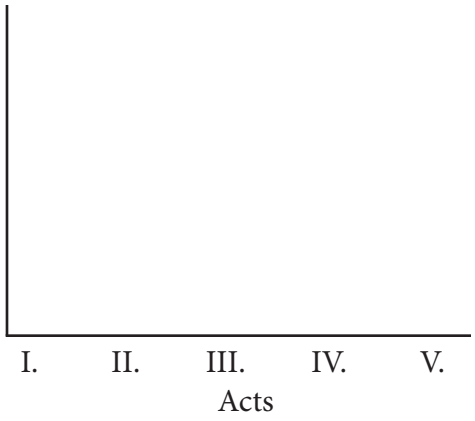


Figure 3: Example Map

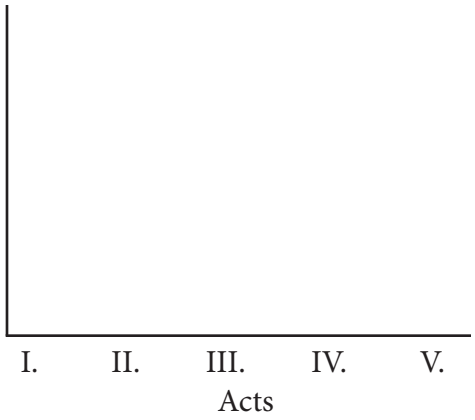
Literature Connection to *The Tragedy of Romeo and Juliet*

Choose two variables from the list below or create your own variables. Create at least two line graphs showing what happened over the course of the play, *Romeo and Juliet.*
Possible variables to graph:

- Romeo's Love for Juliet
- Juliet's Love for Romeo
- Level of Violence
- Animosity between Montegues and Capulets
- Other?



Describe your graph and justify using evidence from the text.



Describe your graph and justify using evidence from the text.

Romeo and Juliet: In Rapturous Oscillation?–Introduction

Open web address: http://www.clexchange.org/curriculum/complexsystems/oscillation/
Select the Romeo and Juliet: In Rapturous Oscillation? Level C simulation and click, "Start."

You'll explore the sections (in bold) as indicated. Remember, you can always revisit a section anytime you like.

1. Click Introduction – Love Dynamics
a. Define the term "dyad" in your own words and give at least two examples.

b. What does it mean to be fickle in a relationship?

c. What does it mean to be a follower in a relationship?

Click Menu. **Click Experiment with the Model. Click Instructions**
Click on the "?" for each of the settings and then define these in your own words.
Romeo's Fickle Factor:

Juliet's Tendency to Follow:

Romeo's Fatigue Factor:

Juliet's Fatigue Factor:

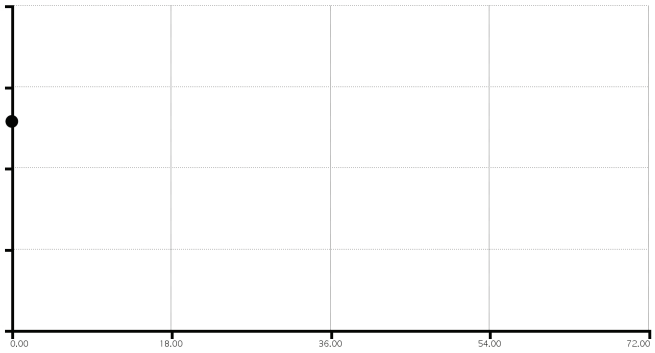
Use the following worksheets to predict and record your virtual experiments.

Run # 1: Baseline Runs for Romeo and Juliet

Input the values shown below onto the simulation screen, but don't run it just yet.

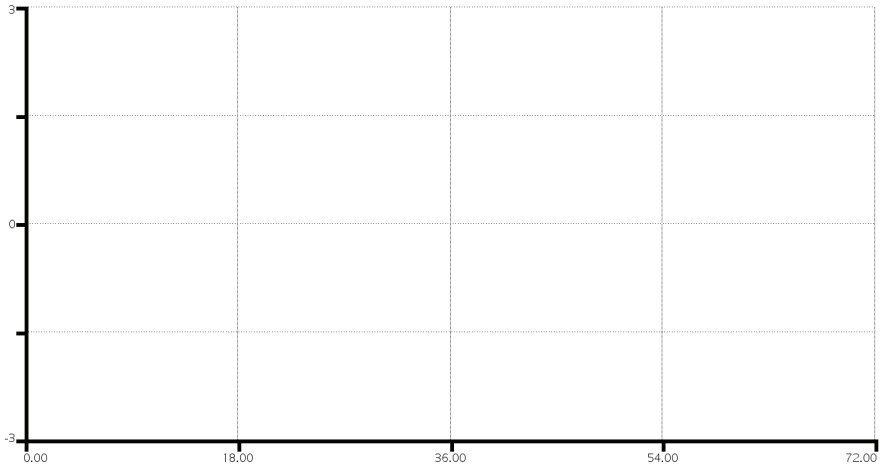
Romeo's Fickle Factor	0.1
Juliet's Tendency to Follow	0.1
Romeo's Fatigue Factor	0
Juliet's Fatigue Factor	0

Predict: What do you think will happen to Romeo and Juliet's love for one another over time?



Draw and label your general prediction as two lines on the graph—one as Romeo's love/hate for Juliet and the other as Juliet's love/hate for Romeo. Note that they will both start at a level of 1, which is at the dot shown on the y-axis. Now **click "Run."**

Analysis: What actually happened? Using two colors, create a key, show the scale on the y-axis, and draw the graphs for Romeo and Juliet. Note that you can see the two graphs individually by clicking the tab  at the bottom left corner of the graph.



Baseline Run (continued)

a. Columnist Clarence Peterson speculated that Romeo and Juliet are kept apart in Shakespeare's play, not by their families, but by "Romeo's fickleness." If this were true, is this a good model of their relationship? Explain the trends on the graph in light of the concept of "Romeo's fickleness." Does "fickleness" explain the behavior you see?

b. Approximately how much time does it take for the relationship to go through one cycle? (Hint: Look at the time distance between two peaks for one of the lines on the graph. You can click and hold on a graph line to see the values.)

c. Why does the relationship appear to oscillate (go up and down) forever?

d. Given the graph on the previous page, what is your estimate as to the percent of time that both Romeo and Juliet are in love with one another "at the same time?" How could your prove your answer?

e. Continue your exploration, asking "What if" questions. Ask one question at a time and then record what happens on a new run sheet.

Question 1: What might happen if Romeo was even more fickle and Juliet was even more of a follower?

Question 2: What might happen if Juliet was more of a follower, but Romeo was less fickle?

Question 3: What might happen if Romeo and Juliet became fatigued by "the game of ups and downs?"

Question 4: What are some other questions you could explore? Write one or more questions below and try them one at a time.

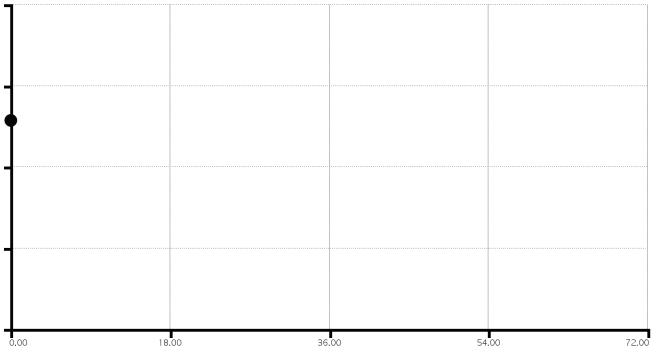
Experimental Run

Run #:_____ **Question:**_____

Make sure to change only one setting from the baseline values that relates to your question.

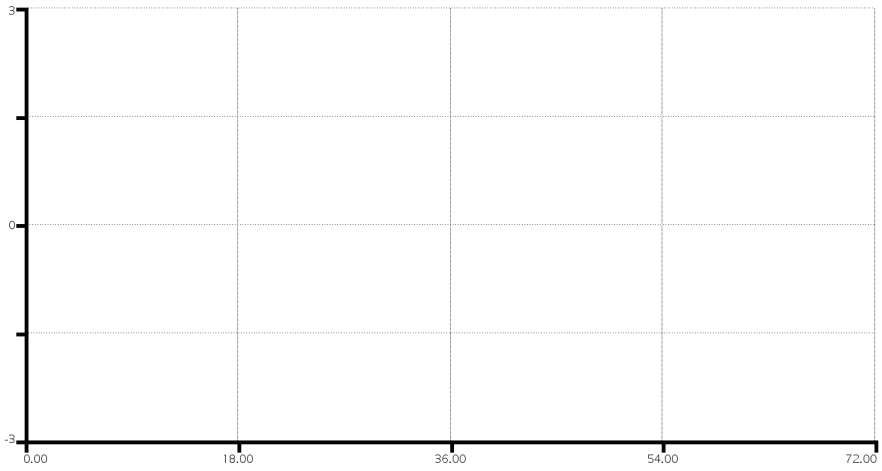
Romeo's Fickle Factor	0.1
Juliet's Tendency to Follow	0.1
Romeo's Fatigue Factor	0
Juliet's Fatigue Factor	0

Predict: What do you think will happen to Romeo and Juliet's love for one another over time?



Draw and label your general prediction as two lines on the graph—one for Romeo's love/hate for Juliet and the other for Juliet's love/hate for Romeo. Note that they will both start at a level of 1, which is at the dot shown on the y-axis. Now **click "Run."**

Analysis: What actually happened? Using two colors, create a key, show the scale on the y-axis, and draw the two lines.



Experimental Run (continued)

a. Explain why you think the relationship changed as it did.

b. Approximately how much time does it take for the relationship to go through one cycle?

c. What do you think is impacting the speed of the oscillation cycle?

d. How does this run compare to the baseline run?

e. What's similar?

f. What's different?

g. What is causing the similarities and differences?

Debrief

Click Menu. **Click 3. Debrief Central.** You'll go through each of these debrief sections to think about what you experienced in the simulation.

Click A. Behavior Patterns. Read and then **click** Explanation of the Graph.

a. Discuss Romeo's role as the contrarian in comparison to Juliet's role as the follower. Look up the term "contrarian" if needed.

Click Continue.

b. What causes faster vs. slower cycles within the relationship? Make sure to discuss specific settings that generate these behaviors.

Click Continue.

c. What causes the cycling to stop? Discuss in terms of the settings and how these are connected to real life examples.

Click Continue.

d. How do you explain this graph?

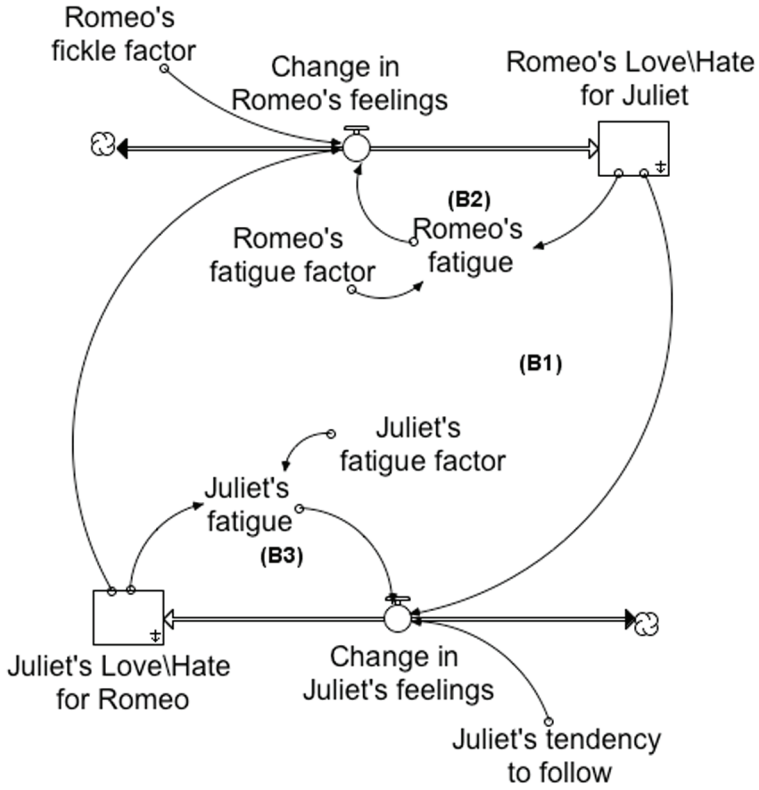
e. Who is most "stable" and who is the most "dramatic?" Why?

f. How do you think the fatigue factors are set in this run? How do you know?

Debrief (continued)

Click Next Section. Back at the Menu, **click B. Explore the Model**.
Click and read through Tour the Model Structure and Tour the Loops.

a. Look at the map below and use it to answer the questions on this and the next page.



b. Explain the elements, connections, and loops within the map. Hint: follow the cause-and-effect arrows around describing the connections along the way. The three loops are B1 (balancing loop 1) which causes the relationship to oscillate up and down, B2 (balancing loop 2) which causes the relationship to stop cycling up and down, and B3 (balancing loop 3) which also causes the relationship to stop cycling up and down.

Debrief (continued)

c. How did changing Juliet's tendency to follow affect the relationship over time?

d. How did changing Romeo's fickle factor affect the relationship over time?

e. How did changing either Romeo's or Juliet's fatigue factors affect the relationship over time?

Click Next Section. Back at the Menu, **click C. Connections.**

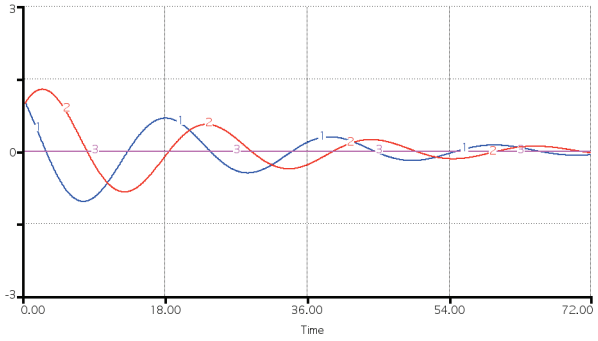
a. How are romantic relationships within the simulation and the interactions during the Cold War similar and different in terms of their structure and behavior over time?

Click Continue.

b. How are romantic relationships within the simulation and fads similar and different in terms of their structure and behavior over time?

c. What are other systems that oscillate in a similar way? Identify and describe at least two connections.

Assessment 1: Romeo and Juliet: In Rapturous Oscillation?



a. Tell the story of the lines on the graph. Why are they going up and down, and then stabilizing?

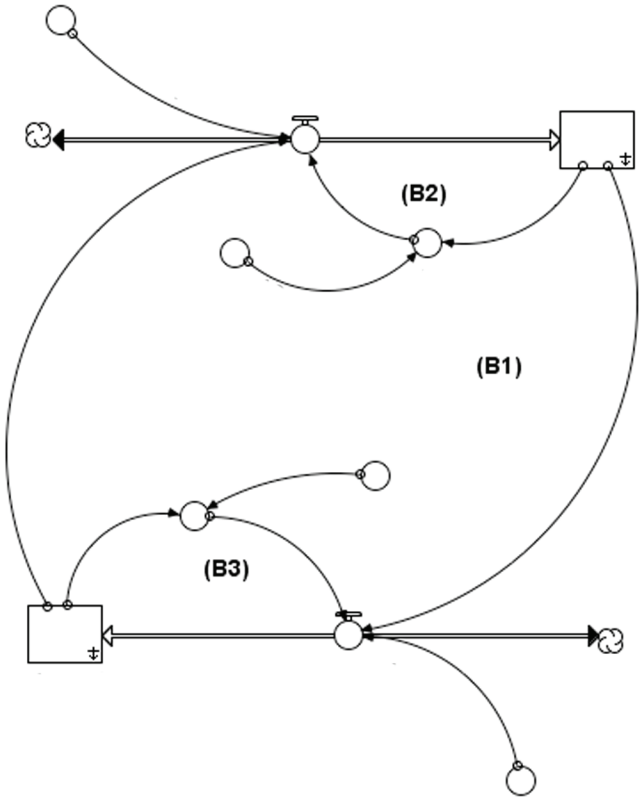
b. What approximate settings would create the graphs above? You can fill in numerical values and/or qualifiers, such as high fickle factor, low fickle factor, no fatigue, some fatigue, etc.

Romeo's Fickle Factor	
Juliet's Tendency to Follow	
Romeo's Fatigue Factor	
Juliet's Fatigue Factor	

c. How might the behaviors been different if the roles in the simulation were reversed, that is, if Juliet was fickle and Romeo was the follower?

Assessment 1: Romeo and Juliet: In Rapturous Oscillation? (continued)

d. Choose one of the connections you listed on the debrief handout or come up with another one. Using the map below, add labels to each of the elements to describe the interactions. You can use the map for Romeo and Juliet on Handout 4 to help you.



e. Tell the story of your map.

Assessment 2 (optional): Romeo and Juliet: In Rapturous Oscillation?

Think of a relationship in your own life or of two people from a book or story. For example, instead of a contrarian (Romeo) and a follower (Juliet), what if both people are enthusiastic about the relationship? What if one likes the other, but the feelings are never returned? How would love look between two shy, cautious people? What might feelings for a future spouse be over the course of a long marriage? If a friendship was once strong but went cold over time, what would that look like?

Provide a short written description of the dynamics you see in this relationship. Who are the people involved—friends, relatives, fictional characters? There is no need to include identifying information if you're describing people from your own life. What happens in the relationship? Be sure to describe the time horizon; are the dynamics playing out over days, weeks or years? Try to describe the situation from both points of view.

On the graph below, sketch the relationship dynamics you've described. Using two colors, create a key, show the scale on the y-axis, and draw a line for each person's feelings of love and/or hate over time.

Finally, list some ideas for what might change the behavior of the relationship. If the relationship is positive, like friendship or love, what might cause it to sour, and vice versa?

Acknowledgements:
Lesson 2 – Level C
Romeo and Juliet: In Rapturous Oscillation?
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Model created with contributions from
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with support from Jay Forrester and the Creative Learning Exchange.

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