The Moving Cell Project

What goes on inside a living cell? Can we use dance to imagine, embody, and understand the conditions inside a cell?

This Art Collector Set is based on the work of a scientist and an artist who collaboratively investigate these questions. David Odde is a biomedical engineer who studies how cells crawl and divide. Carl Flink is a choreographer and the director of Black Label Movement. His dancemaking is known for its intense athleticism and humanistic themes. Together, their work is called **The Moving Cell Project**.

------- THE SECTION BELOW IS FOR EDUCATORS -------

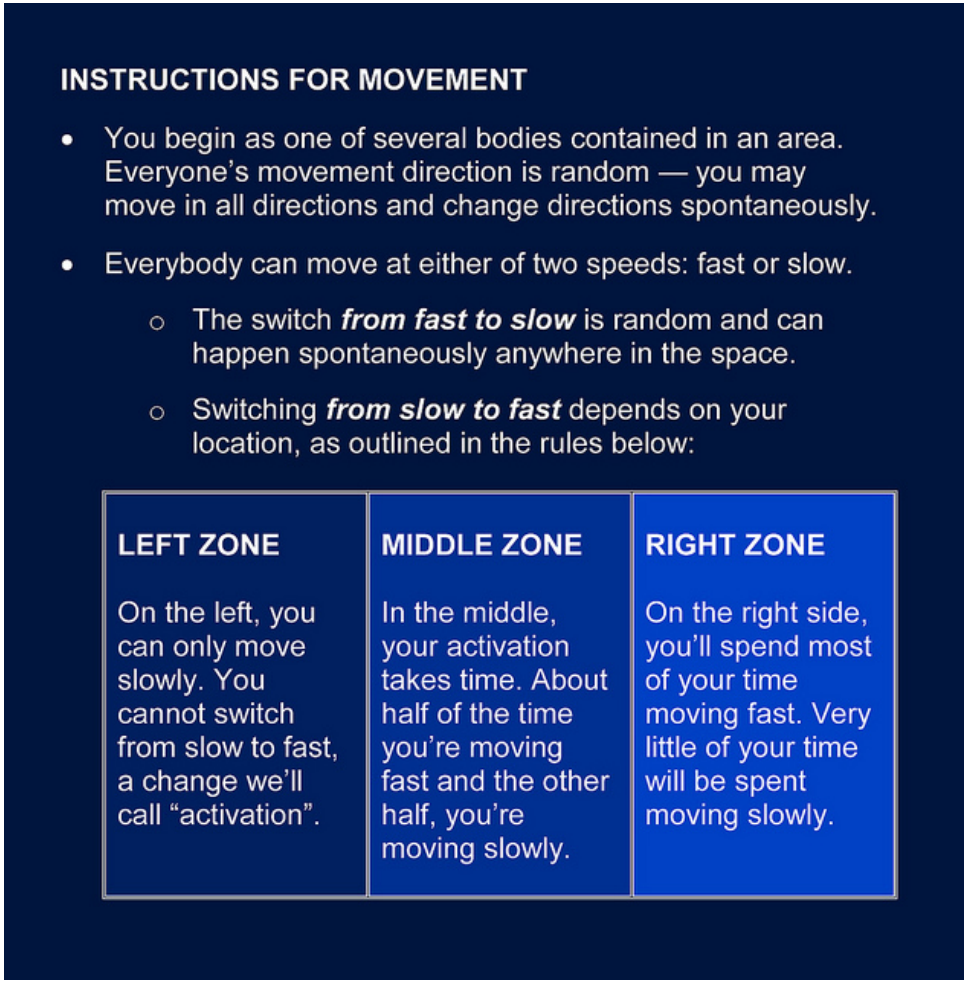
This Set demonstrates a multidisciplinary approach that lends itself to arts-infused or arts integration teaching. Relevant areas of study include dance, movement arts, physical education, and the sciences (biology, physics, chemistry). This Art Collector Set is designed with two potential uses in mind:

A home study module for a flipped classroom. Before assigning the Set, use class time to cover essential vocabulary (bodystorming, cell, hypothesis, molecule, etc.). Outside of class time, students review the Set independently (or in small groups). Then exploration continues in the classroom. *VARIATION: The slide titled* "More predictions and rapid-prototyping" *could be removed from this home study module and used instead as a classroom activity. To do so, rephrase the thought experiments as active bodystorming experiments to be performed and analyzed during class time. RESOURCES: Please see the attached list of teacher resources.*
Professional development and source material for educators. Educators are encouraged to digest the content of this Set and use it to generate their own lesson plans. APPENDIX: An appendix is attached for in-depth study of **The Moving Cell Project**'s work. *This Set was developed through a partnership with Walker Art Center and*

Perpich Center for Arts Education (Dance Outreach).

Feel free to customize this Set by making modifications appropriate for your classroom. As a registered user of ArtsConnectEd, first duplicate this set to make a copy in your account, then edit its contents using Art Collector.

Predict what will happen



To the left are a set of movement instructions. Read all the "rules" carefully. Then conduct a thought experiment to imagine what happens to the bodies and their locations in space through time.

Before going to the next slide, ***make a prediction. What do you think will happen as time passes?***

Human Movement-Based Modeling

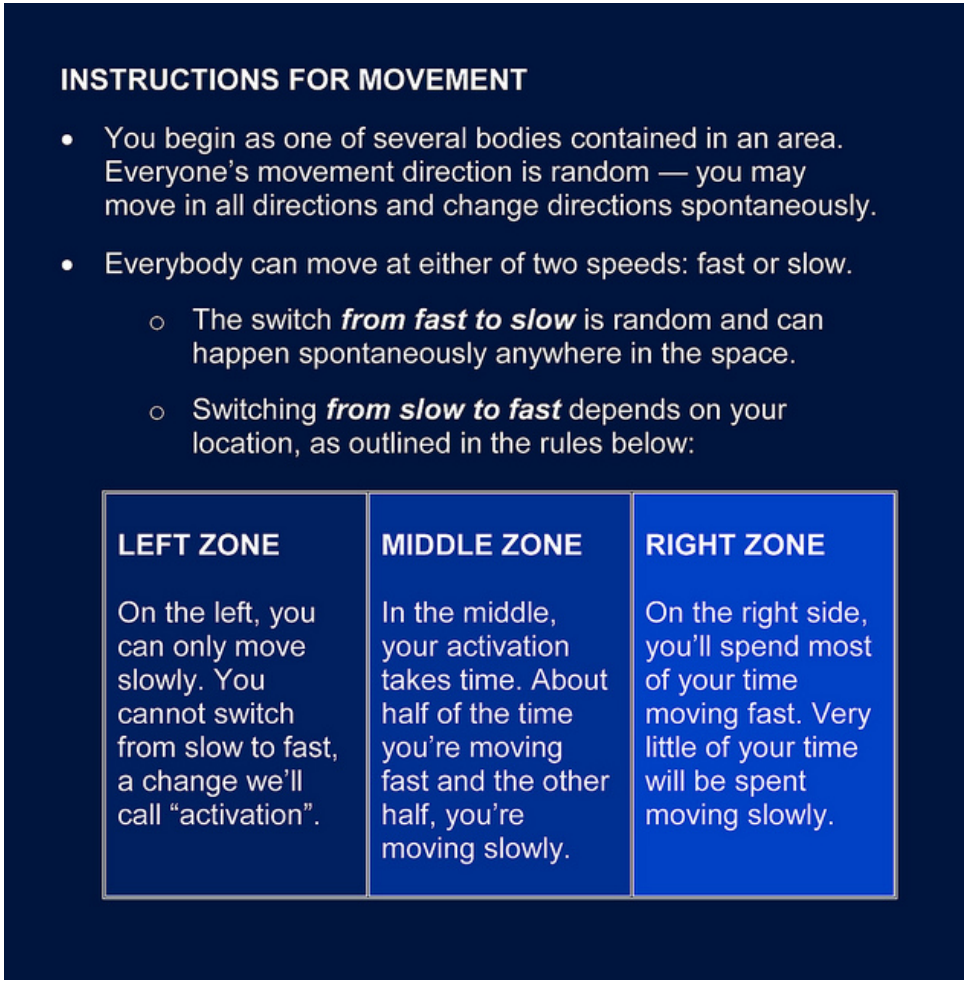
The thought experiment you just tried was based on **The Moving Cell Project**, a collaboration between scientist David Odde and choreographer Carl Flink. Before hitting play, read the following paragraph.

When Dr. Odde talks about **symmetry**, he's describing the way certain kinds of molecules are evenly spaced (or uniformly distributed) within an area or 3-dimensional space, such as a cell. When Odde talks about **"symmetry-breaking,"** he means that those same molecules stop being evenly spaced and begin to concentrate in one place and become scarce in other other places. Odde goes on to say that symmetry-breaking is an important step in **"establishing the basic body plan."** This refers to the fact that a dividing cell (look for it in the video that will play behind Odde) eventually develops into an animal with an anterior (head) and a posterior (tail). Leading up to the cell's first division, the cell's poles become different from one another, and this is the basis for its body plan, its orientation of head and tail.

Now watch the video up through the 3:25 mark, in which dancers move according to the instructions. The moving bodies represent "MEX-5" molecules, one of several molecules that start out evenly distributed and become concentrated at one of the cell's poles.

You may want to watch the video segment more than once, referring back to the terms defined above. When you're ready, stop the video and go to the next slide.

More predictions and rapid-prototyping



What goes on inside a living cell? Can we use dance to imagine, embody, and understand the conditions inside a cell?

Biomedical engineer Dr. David Odde and Black Label Movement dancers use **bodystorming** to investigate what's going on inside a living cell. Odde and Flink start with ideas about about the moving elements (or molecules) inside a cell. Then they create a set of movement instructions to play out and test questions they have. When dancers follow the instructions, they model conditions inside a cell by using their bodies to represent particular molecules.

Try this thought experiment again using the same instructions but varying the starting conditions. In each case, predict what happens.

Variable 1: Number and density of molecules. Think about these instructions with 10 or fewer molecules in the space. Then think about if there were 100 or more molecules. **Variable 2: Starting position of the molecules.** What if all the molecules started in the right zone? The middle zone? The left zone? Then use your journals to respond to the following questions:

If each of the "dances" above were "performed" multiple times, would they always look exactly the same? What *would* and what *wouldn't* change? How are these bodystorm simulations similar to or different from conducting science experiments? Now that you've seen the

bodystorming exercise on the previous slide, imagine how the "dances" above would play out differently. How would they feel different in the dancers' bodies or look different to the audience?

After watching the video, respond to the following questions in your journal:

How do David Odde and the other scientists use dance to understand their hypotheses and inform their research? How do choreographer Carl Flink and the BLM dancers use science as a starting point in their creative process? What makes **The Moving Cell Project** successful as a collaboration? What should collaborators bring to the table so that work like this can succeed?