

Handouts

Using Reading and Writing to Support Learning
Gateway Resource URAW0004

Thinking Like an Expert: Guidelines for Modeling and Thinking Aloud in Content Area Classrooms

Thinking aloud is an instructional strategy that helps students learn how to monitor their own thinking and learning. It involves overtly sharing what you are thinking and the decisions you are making as you process information while reading or writing texts, completing tasks, and solving problems in your content area.

Before the Think-Aloud Lesson

- Select a short section of text, a task, or problem. Make a copy for display during the demonstration lesson. If applicable, make copies for students.
- As you prepare, put yourself in the role of your students. Consider what students need to know how to do: to read and comprehend the text; draft, revise, and edit their writing; complete the task; or solve the problem.
- Think about your own experiences related to the specific content, skill, or strategy. Make explicit for students what you automatically and subconsciously do.
- Decide where you will stop and think aloud.
- Plan what you will say at each stopping point. On a sticky note (or in the margin), write questions and comments that come to mind. Use “I” statements to tell what you are thinking or doing as you read and think through the text. Place these notes directly beside each part of the text, task, or problem.

The following general strategies and sample prompts can be used to demonstrate how experts construct meaning as they read or write texts, complete tasks, and solve problems.

| General Strategies | Sample Prompts |
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| <p>Preview the Text, Task, or Problem and Notice Text Features</p> <p>Recognize and use text features and cues to text structure such as transitions, headings, illustrations, captions, charts, etc.</p> | <ul style="list-style-type: none">• Ask: How is the text organized?• “The [title, author, pictures, captions, book design] makes me think of ____.”• “The title makes me think that this will be about ____.”• “The comments on the back cover lead me to believe that ____.”• “The [photographs, charts, diagrams, headings, subheadings] make me think that ____.” |

| General Strategies | Sample Prompts |
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| <p>Hypothesize, Infer, Draw Conclusions</p> <ul style="list-style-type: none">• Make predictions, hypotheses, and conjectures.• Test and verify their validity.• Develop and evaluate proofs.• Revise as new information is revealed.• Distinguish between facts and opinion based on empirical or scientific evidence.• Detect fallacies in authors' evidence.• Discern cause-and-effect relationships. | <ul style="list-style-type: none">• Ask: What [predictions, hypotheses, conjectures] can I make based on ____?• "Based on ____, I [predict, hypothesize, infer, draw the conclusion] that ____."• Ask: Are my hypotheses holding up, or do I need to change my predictions?• "I think that ____ will happen next because ____."• "I wonder whether ____."• Ask: What inferences do I need to make to fill in gaps in the information? What is the author implying?• "I imagine the author believes ____."• "The evidence [proves, disproves] ____."• Ask: What conclusions can I draw based on this information?• "This could help me with ____."• "Because ____ happened then, I bet the next thing that will happen is ____."• "This is like ____."• "I think ____ because ____."• "I notice ____."• "____ makes me rethink ____." |
| <p>Visualize</p> <ul style="list-style-type: none">• Create mental images by "seeing" people, events, and relationships between concepts.• Develop and adapt images to match new information as you continue to read or complete the task or problem. | <ul style="list-style-type: none">• "In my mind, I see ____."• "I imagine ____."• "I see ____."• "I have a picture of ____."• "Now I have a clearer understanding of ____ because ____." |

| General Strategies | Sample Prompts |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Connect <ul style="list-style-type: none">Identify the topic and consider personal knowledge about the topic.Ask: What do I know about this or a similar topic that might help me?Make connections to what has been read previously or already learned.Apply what is being learned to your own life. | <ul style="list-style-type: none">"This reminds me of ____ because ____.""This [connects, does not connect] to what I already [know, read] because ____.""This part is like ____ because ____.""This is similar to ____.""This ____ makes me think of ____.""This is helping me to think about ____." |
| Monitor Comprehension and Use Fix-Up Strategies to Clarify Confusion <ul style="list-style-type: none">Reread.Read aloud.Slow down and reread.Read on and see whether the confusion clears up.Replace unknown words with familiar ones that make sense in context or look up words in a dictionary.Review and synthesize previous ideas or information and look for patterns.If still confused, try another strategy or ask for help. | <ul style="list-style-type: none">Ask: Is this making sense?"This [is, is not] making sense because ____.""This makes sense now because ____.""No, I think it means ____."Ask: When did I lose track? When did it start to go wrong?"This part is really saying ____.""At first I thought ____ but now, I think ____.""Something I could do is ____.""Because I do not understand this word, a good strategy would be to ____."Ask: Do I need to put pieces of information together to see a pattern?"I need to revise my thinking by ____.""What I thought this was about no longer makes sense to me because ____." |

During the Think-Aloud Lesson

- Begin by explaining what a think-aloud is, why it is helpful, and when to use it. Explain that you will think aloud to show what is going on inside your head as you read or write text, complete a task, or solve a problem. Clarify that students will only observe and not interact with you. Questions and comments will be shared afterward.
- Display the text, task, or problem and have copies for students so they can follow along.
- Begin reading aloud or writing text, completing a task, or solving a problem. Stop frequently to think aloud at designated places.
- Underline or circle words and phrases that prompt the use of a particular skill or strategy.

After the Think-Aloud Lesson

- Discuss and list the cues and strategies used during the think-aloud.
- Ask students to identify other situations in which they could use the same strategies as they read or write different texts, complete tasks, or solve problems.
- Provide ample opportunities for students to practice with similar texts, tasks, or problems in small groups or with a partner.

Examples of Thinking Aloud in the Content Areas

English Language Arts

"When I was in high school, we read Homer's *The Odyssey*, and I was lost from the start. I skipped the introduction, which summarized the plot, and had no idea about the literary devices that were used. So today, I will share what I think as I read as a model to help you get the most from this famous poem. First, as I open the text, I see there is a chart called *People and Places* and some guidelines for reading an epic. So I read these parts for background information. Now I understand that long ago, *odyssey* did not refer to a journey; Odysseus is the hero, also known as Ulysses.

"As I start reading the first section, 'I am Laertes' son, Odysseus,' I see that the hero will tell his own story. But already I am stuck on the next lines: 'Men hold me formidable for guile in peace and war'—what does that mean? I thought *guile* meant 'crafty deception.' So I got a dictionary and found a second meaning, 'cunning in attaining a goal.' That makes sense in war. Going on, I read that 'My home is on the peaked sea-mark of Ithaca'—I'm sure he did not mean Ithaca, New York! Oh, there is a side note—it is an island off Greece. Reading on, he says the rocky isle was good for a boy's training, and I pictured him climbing the rocky areas and pushing himself to new physical limits, overcoming fear. I love to rock climb, too!"

Mathematics

"I know it's hard to read math texts, so I will think aloud to show you how making connections as you read helps you understand things better. Turn to the chapter *Systems of Linear Equations*. Let's read the first part together, and I will explain how I figure it out by reading text, examples, and problems as a chunk, instead of trying to understand every sentence. First, there is a definition: 'An equation is termed linear if, in a given set of variables, each term contains only one variable, to the first power, or is a constant.'

"I think to myself, 'I like numbers, but I do not easily grasp written explanations.' So instead of trying to figure out this sentence yet, I will continue reading for some examples. So I read Example A: '4x + y = 8 is linear in x and y, but 4xy + y = 8 is not, due to the presence of xy.' Next, I compare this example to the definition. Now it makes more sense: There are two terms in the first equation, 4x and y, and both have only one variable. But the term 4xy has two variables. So I get that. But what does it mean in the definition—to the first power? All the numbers are to the first power. So I look ahead to the problems to see whether there is a clue. Aha, problem C: 'Is $5x^2 - t + 6 = 0$ a linear equation?' No, because it has a second power. Next, I need to figure out the meaning of *constant*; I'm not sure, so I go to the glossary to double-check my thinking. Yep, it is a number on its own and an opposite to the word *variable*."

Science

"Who can draw an ionic compound?" When no hands went up, the teacher realized students overlooked the figures in the text during the homework reading. "I'll do a think-aloud to show you how to figure it out. So I am you last night, reading along on the page about how combining sodium ions and chloride ions creates sodium chloride. I try to picture that in my mind and what I see is stirring eggs in a cake mix where the ingredients dissolve together. But is that the right image? I see that the text says 'see Figure 7-2.' I quit reading the words and spend a few minutes analyzing the graphic of a cube-like structure with green and gray dots. What is the point? Then I read the sidebar explaining the figure, and I see that it asks: 'How many sodium ions surround each chloride ion?' Hmm, I did not even look for a pattern like that. That is cool. No matter which chloride ion I look at all over the 3D cube, there are always three sodium ions around it—and vice versa when chloride ions surround the sodium ions. So that is what they mean by balancing the electrical charges."

Social Studies

Noting that students complained about too much homework, especially studying for tests, the teacher asked how many students reread the entire chapter. Almost all students did. To help them see how to skim and scan, she modeled the process with a think-aloud.

"We just read Chapter 6 on the federal era. I start my studying by going to the table of contents to check what I already know. Yes, I think I am clear about Section 1, the new government at work. I understand the Bill of Rights and the judiciary and executive offices, but I do not recall Hamilton's fiscal program. So I look up that page and quickly read just the first sentence of every paragraph until I see in the fifth paragraph that his program included three recommendations. I jot these in my notes.

"Returning to the table of contents, I see that I am confident about the next set of topics, but I recall the teacher emphasizing the Alien and Sedition Acts, so I will brush up on those, too. And then I will reread the summary at the end of the chapter—that will help me on the essay."

Sources:

Council of Chief State School Officers. (2007). *Content area literacy guide* (p. 67). Retrieved from <http://teacherquality.paec.org/CONTENTAreaLitGuideCCSSOL.pdf>

Wilhelm, J. D. (2001). *Improving comprehension with think-aloud strategies*. New York, NY: Scholastic.

Where Do Baby Turtles Go During Their Lost Years?

By Ed Yong

Never agree to write a turtle's biography. You will, at one crucial point, run out of material.

Every sea turtle begins life in the same way. It hatches within its buried nest, forces its way to the surface, and sprints toward the water past a gauntlet of crabs, birds, and other predators. Many die, but they emerge in such numbers that there are plenty of survivors. They dive beneath the waves... and disappear.

By the time Atlantic loggerhead turtles start showing up in coastal waters again, they have grown from palm-sized infants into large animals whose shells are a couple of feet long. They must have been away for several years, but their movements are secrets withheld by the vastness of the ocean. We know the beaches that the baby turtles hatch from and many of the sites where adults go to feed and breed, but their biographies are missing the all-important childhood chapters.

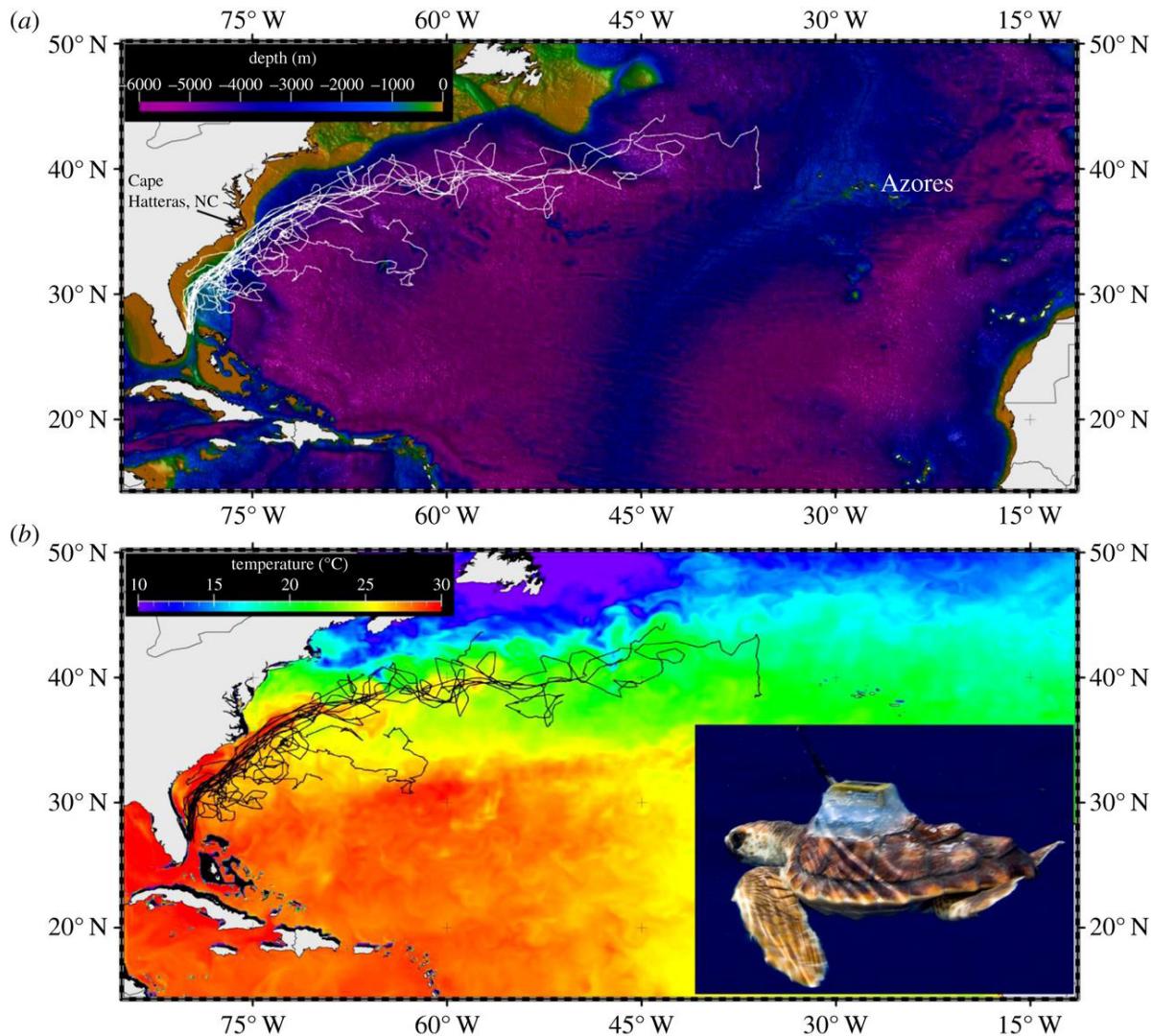
"It is easy to walk along a beach, counting nesting females or successful hatchlings," says Katherine Mansfield from the University of Central Florida, who has studied turtles for over 20 years. "It is much harder to survey an entire ocean basin."

Mansfield does not have to. By fitting 17 newborn loggerheads with tiny satellite tags, she has tracked their movements and made a clear map of their so-called "lost years."

Her team took a long time to perfect the tags and tested them extensively in the lab to make sure that they would not interfere with the tiny babies. They could not be too heavy, so the team used solar panels rather than clunky batteries. They could not be too buoyant either. And most importantly, they had to stick for as long as possible. When the team used glue, the turtles' shells grew so quickly that the tags all fell off within few weeks.

"We realized that the turtles' shells are made of keratin—the same thing as human fingernails," says Mansfield. "So we contacted my collaborator's manicurist, and she suggested using an acrylic base coat to seal the shell from peeling." Her idea worked. The tags finally stuck.

The team released the turtles off the southeast coast of Florida, and the tags tracked their movements for anywhere from 27 to 220 days.



At first, the babies all followed the Gulf Stream, the warm current that flows from the tip of Florida past the eastern seaboard of the United States and across the Atlantic Ocean. They hugged the edge of the continent at first, but once they got past North Carolina, they left these predator-rich waters and headed eastward into more open waters. In just 7 months, one of them swam as far as the Azores—more than 3,000 miles away—before its tag finally came off.

Some of this fits with what scientists had guessed, based on circumstantial evidence. Loggerheads that hatch in Florida clearly head northeast because loggerheads in the eastern Atlantic are genetically linked to those that nest in the west and also bigger.

Mansfield's data also offered a few surprises. Most people assumed that the turtles stay within the North Atlantic Gyre—a set of powerful currents that circle clockwise around the Atlantic and that include the Gulf Stream. That is mostly right, but the turtles were not carving a fast or straight path across the Atlantic. Overall, they headed in the right direction, but they also spent a lot of time going in local circles. Some of these deviations took them out of the Gyre altogether into the Sargasso Sea—an area in the middle of the Atlantic rich in floating sargassum seaweed.

"The basic overall pattern of movement is similar to what has been proposed previously, but there is considerable variation in the individual paths that different turtles take," says Ken Lohmann at the University of North Carolina, who studies the magnetic senses of turtles.

"The findings are consistent with recent models suggesting that young turtles are active navigators and do not simply drift passively with the currents," he added. "They also support the idea that turtles use regional magnetic fields as open-ocean navigational markers and correct their headings when they are in danger of swimming too far north or south."

Mansfield also suggests that the turtles might have encountered a floating habitat, like sargassum, and just stayed with it until they ended up in the Sargasso Sea. Sargassum is a good habitat for a baby turtle. Its brown fronds, branches, and floats provide shelter from predators. They also absorb a lot of sunlight, warming the local water by 6 degrees over the surrounding ocean. Turtles are cold-blooded and could grow faster in warmer waters, reaching sexual maturity at an earlier age and outgrowing potential predators.

The turtles also spent most of their time near the ocean surface—another trait that would help to keep them warm. Water is water to us. To a turtle, the seaweed-filled surface waters are the equivalent of luxury accommodation.

Mansfield now wants to study the lost years of other turtle species, including those from other oceans with different currents and scarce sargassum. "There are so many questions that still need answering," she says.

Source: Young, E. (2014, March). Where do baby turtles go during their lost years? *National Geographic*. Retrieved from <http://phenomena.nationalgeographic.com/2014/03/04/where-do-baby-turtles-go-during-their-lost-years/>

Pronouncing and Defining Words Routine

- Write the words on the board with the syllables identified.
- Say the word with students:
 - Speak slowly, enunciating each syllable.
 - Stress each accented syllable.
- Repeat two or three times at a normal rate of speech.
- Tell students the simplified explanation or have them read the explanation with you.
- Repeat the word and its definition.

Scaffolding Pronunciation

- Always pronounce content-specific words when introducing vocabulary.
- Frequently remind students to use the routine.
- Be respectful of English language learners and speakers of nonstandard dialects.

Scaffolding the Definition of Words

- Always provide a student-friendly definition (include illustrations or diagrams where appropriate) for any new academic or content-specific word.
- Check students' understanding of the word:
 - Options include asking partners to use the word in a sentence or to give examples of the word.
 - Support students who struggle, and reword the student-friendly definition if necessary.
- Gradually increase the precision and technicality of the definition. Start with a student-friendly definition, and then scaffold toward an understanding of the formal definition as it would be used in the discipline. For example:
 - *Hypothesis*: something you think is true, but you are not sure (student-friendly)
 - *Hypothesis*: an unproven answer to a question (slightly more technical)
 - *Hypothesis*: an untested theory about something unknown (more formal)
- Point out cognates and false cognates:
 - www.colorincolorado.org/cognates.pdf
 - www.latinamericalinks.com/spanish_cognates.htm
 - <http://textproject.org/resources/spanish-english-cognates>
 - www.miguelmllop.com/glos/index.php
- For assistance when planning and composing the simplified explanations of words, refer to the following Web sites:
 - www.oup.com/elt/catalogue/teachersites/oald7/?cc=global
 - <http://dictionary.cambridge.org/results.asp?dict=A>
 - www.mathwords.com

August 2, 2009
METRICS

For the Unemployed, the Day Stacks Up Differently

By Amanda Cox, Shan Carter, Kevin Quealy, and Amy Schoenfeld

Nearly 1 in 10 members of the American work force are unemployed—a level not seen in 27 years.

Without a paying job, these Americans have picked up other forms of labor: vacuuming the house, sending out résumés, taking classes, and caring for family. And the unemployed have more time for leisure and socializing.

Sunday Business analyzed new data from the American Time Use Survey to compare the 2008 weekday activities of the employed and unemployed. The comparison may seem obvious, but differences in time spent by these two groups can be striking.

On an average weekday, the unemployed sleep an hour more than their employed peers. They tidy the house, do laundry, and do yard work for more than two hours, twice as much as the employed. The unemployed also spend an extra hour in the classroom and an additional 70 minutes in front of the television.

The annual time use survey, which asks thousands of residents to recall every minute of a single day, is important to economists trying to value the time spent by those not bringing home a paycheck.

"If all we were doing is substituting production at home for production in the marketplace," said Daniel S. Hamermesh, an economics professor at The University of Texas at Austin, "then maybe unemployment wouldn't be so bad."

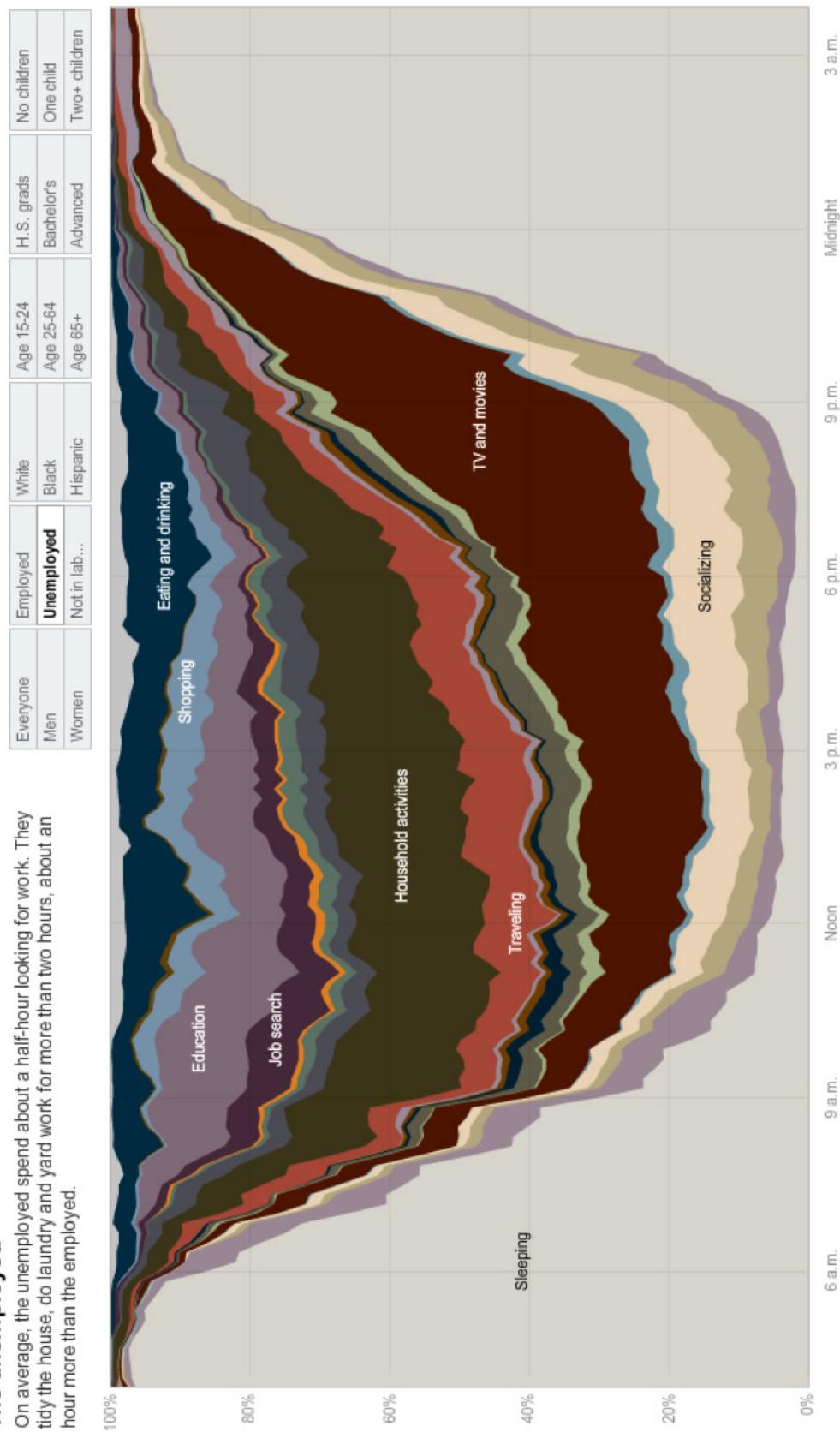
Source: Cox, A., Carter, S., Quealy, K., & Schoenfeld, A. (2009, August 2). For the unemployed, the day stacks up differently. *The New York Times*, p. BU5. Retrieved from <http://www.nytimes.com/2009/08/02/business/02metrics.html>

How Different Groups Spend Their Day

The American Time Use Survey asks thousands of American residents to recall every minute of a day. Here is how people over age 15 spent their time in 2008. [Related article](#)

The unemployed

On average, the unemployed spend about a half-hour looking for work. They tidy the house, do laundry and yard work for more than two hours, about an hour more than the employed.



How Different Groups Spend Their Day

The American Time Use Survey asks thousands of American residents to recall every minute of a day. Here is how people over age 15 spent their time in 2008. [Related article](#)

The employed

At 6 a.m., about 60 percent of employed people are sleeping, compared with more than 80 percent of those who are unemployed.

