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a special note of thanks to...

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for sharing all your wisdom with us!
# SCIENCE OF THE MIND JOURNAL

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**2010**

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SARA LEPKOFF, now a senior, has attended Compass School for six years. Because she enjoys thinking deeply about topics that are meaningful to her own life, investigating the neurology of happiness has been especially relevant. She hopes that her topic will help others to understand more clearly what happiness is on a scientific level and help some people make sense of their emotions. While she’s not enjoying her time in Science of the Mind class, poking brains or investigating neurons, she can be found enjoying the outdoors or honing her skills as a budding journalist at The Commons newspaper in Brattleboro.

CAITLIN GREVE likes to wear fake glasses with no lenses because it’s like trying out a different identity—except not really. She especially likes to wear ones that have duct tape on them that she bought for 27 cents at a thrift store. They look really geeky, and geeks tend to have a lot of personality. Caitlin used to do things because she thought she had to, but lately she’s doing things because she’s not afraid anymore—like, for example, wearing those glasses. Until recently, she used to not talk very much. At the end of the day, she would typically go to a particular bed of ferns to write down all the thoughts she wasn’t able to vocalize. Now though, by day’s end, her voice is often hoarse. Caitlin is interested in pursuing a career that positively impacts the world. She is interested in working with autistic children.
**KYLE TAKEI** was born in Santa Ana, California, and spent much of his childhood travelling and moving around the country. As a child, Kyle was heavily influenced by his family’s love of science, and spent much of his free time learning everything he could about space, history, and other areas of science. He studied ADHD after years of going undiagnosed with ADD, and wrote an article about adult ADHD because of his thirst for information about what will happen to him as he gets older. When he isn’t writing science articles, Kyle can be found writing fiction, or working on photography projects at InSight Photography Studio in Brattleboro, VT.

**ALIANA BLOCH** has always been fascinated with the workings of the mind. Now a junior, Aliana lives in Brattleboro Vermont, and enjoys spending time outdoors and doing artwork. Aliana designed both of the covers and many other images for our journal, integrating pencil, collage, paint, and digital media. She recently returned from a trip to Ecuador where she discovered her passion for living simply and off the land. She hopes to go to art school and base her independent lifestyle around her artwork. She loves exploring different perspectives in science as well as the rest of her life.

**JOSH RAMSEY** is a junior from Chesterfield, NH. Last fall he enrolled in an Introduction to Psychology course at River Valley Community College, in Keene, NH, where he discovered his newfound interest in the mind. A New Hampshire native, Josh can be found playing ultimate Frisbee and creatively thinking while making everything from homemade board games to silent films. He aims to study a human service-related field in college, but is still open to the possibilities.
LENAGLICKMAN has been using her brain since she was born. She has a complicated relationship with it, but continues to use it for a wide variety of activities. Some of her favorite uses for it are making art and considering evolutionary psychology. She tries to tilt it toward happiness with meditation and contemplation, but sometimes she just settles in and listens to its chatter.

ARIEL TEMPLE was inspired to research the effect of sleep deprivation on teens after waking up for two years to the dreaded thought, “Do I have to go?” Now, as a junior at Compass School, Ariel gets to sleep a little bit later and enjoys using her brain to study theater, art, and writing. When not at school, Ariel can be found incorporating her passion for art into her schoolwork or walking along her Harrisville Pond in New Hampshire with a journal. She hopes to go to study art, both performing and visual, in college.
AMIR FLESHER believes that education should be about learning to be happy and at peace; that’s why his Science of the Mind students spend time eating oranges very slowly, contemplating morality, marveling over the mystery of the human visual perception system, and analyzing how T.V. commercials attempt to manipulate our emotional minds. Amir figures that if we humans get to know our minds a little better, maybe we can relax and enjoy the day just a bit.

BETH WHITE was raised on her grandparent’s farm in northern Vermont. Her amazing childhood provided her with a strong foundation and love of science and nature. The first in her family to attend college and graduate school, Beth graduated from Antioch New England University in 2002 and has been teaching high school science ever since. The last three years at Compass School have been the greatest professional experience of her career. To be able to take students on international service learning trips, to dissect human brain tissue at places like the Harvard Brain Bank, and to collaborate with amazing staff has been a dream come true!

JESS SKINNER fell in love with science in the 7th grade while dissecting frogs and is now attending Antioch University New England, where she is a candidate for a Masters in Environmental Studies with a Biology Teacher Certification. She loves a good inquiry-based science lesson and is making it her life’s work to connect people to their natural environment as well as their community. She volunteers with the Monadnock Farm and Community Connection in Keene New Hampshire when she is not student teaching at Compass School and is currently an intern with the Cornucopia Project in Hancock, NH. Her passions and interests include fiber arts, rock climbing, playing music, gardening, composting, and teaching.
THE LANGUAGE OF LAUGHTER
why we laugh
BY LENA GLICKMAN

In an office without windows, my dad stares at a computer. He is trying to use new pricing software, and he’s spent many hours on it. His time is valuable; he runs this business, his to-do list is long. His face is scrunched up and close to the computer screen. Suddenly, the computer beeps and goes black. His head jolts in surprise. He tries turning the computer back on, his head in his hand now and his forehead creased. It does not turn back on, and he remembers that he didn’t back up the files he was working on. He sighs heavily. It’s 5:00, so he decides to go home and work on it there. He feels the heaviness of frustration as he walks out to his car, slamming the door harder than usual. Normally, when driving to and from work my dad laughs. Every since he took a “laugh yoga” class a few months ago, a gathering of people with the sole intention of laughing, he has done this. He doesn’t need to go to the classes anymore since he does it on his own.

But as he gets in the car this day he doesn’t feel like laughing. He is reviewing all the extra work he’ll have to put in, thinking about how tired he is. Before he has sunk too deep into his frustration, he realizes that now is the perfect time to laugh. It takes a little longer than usual to start this time. Normally all he has to do is think about laughing, or, amusingly, pant a few times (he finds that moving the same muscles that are active in laughter helps to get him going). He is able to start eventually, just chuckling slightly at first. His laughter builds on itself, turning high and uncontrollable. When he thinks of his lost time and work, and his broken computer it makes him laugh more. He is struck by the silliness of being upset by it, by the inconsequentiality of what has happened. He will still have to make up the work and buy a new computer. He will be tired tomorrow from working late tonight. But for this moment laughter lightens his load, opening a window and letting a beam of absurdity flow into him, if only for the car ride home.

In this story my dad’s laughter is therapeutic and intentional. This is just one experience of laughter. It can be many things; embarrassing, joyful, nervous or cruel. He laughs to release stress, to feel better. We laugh because things are funny, because we feel uncomfortable, because we’re happy. But when I stop to think about why we’re really laughing, I come across a gap I need to jump. Here is a simpler example of what I’m talking about. We eat fatty foods because they taste good. But they taste good because humans evolved to enjoy them because they gave us the fat we needed for energy. Today fatty foods cause some of our most common illnesses but in the time when this mechanism evolved, a time when food was scarce and exercise unavoidable, they were necessary. That fatty food is a problem now illuminates the following concept: though many of our biological and psychological mechanisms evolved because they facilitated our survival, now that we have them, we often use them in ways that are separate from their evolutionary advantages. Once a trait has developed it is dependent on its biological mechanisms rather than its evolutionary purpose. The gap is between what goes on in our head—the reasons we believe we’re doing something—and the evolutionary reason we’re doing it. We have evolved to like the taste of fatty foods, but when we enjoy that taste we are not experiencing or enjoying it because of the evolutionary history of our taste buds. This is the gap I’m talking about.

In this story my dad’s laughter is therapeutic and intentional.
I think that this break is present in laughter as well. Why is my dad laughing in the car? Why do we laugh at all? Because things are funny. But why are things funny? Why does experiencing something funny cause us to make strange, animalistic noises, shaking and grimacing? And are we even really laughing because things are funny? Scientists have a few theories and no sure answers.

Consider the following story. Sitting in a classroom, doubled over and shaking, my friend and I cannot stop laughing. Our classmates are looking at us, a mixture of amusement and frustration in their faces. The teacher waits for us to stop. This has been happening frequently in this class for the past few weeks. The class had just begun trying to meditate. Someone’s stomach grumbled, but I couldn’t really say if that’s what started it. My friend lets out a short giggle and then we are both laughing. It comes in waves. The noise builds up and then overflows into silent shaking. Finally we calm down, but seconds later, begin again. Eventually the rest of the class stops trying to meditate and turns to look at us.

Our teacher asks us why we’re laughing, but we can’t explain it. It may have started with that grumbling stomach suddenly striking us as funny, but I have a feeling it was about something more. We have gotten much closer in the past month, and have a new feeling of connection and understanding, not just of each other’s personalities, but of each moment as it is.

I see a few reasons why our closeness would lead us to laughter. One is that we are sharing the same, or similar, views of the silly things we see, and so the same things set us off and cause our laughter to build up. Another is that looking closely and trying to really feel each moment that we experience highlights the absurdiess that hide in almost all situations. The other is that building a new friendship like this one makes us happy, and our laughter, at moments when we especially feel our connection, is a manifestation of this joy.

People tend to think of laughter as a response to something funny. And of course some of the time, it is. In the laughter described above, humor plays a part, but is not the sole cause. It is just as much, or more, about our relationship as it is about humor and, in general, the most common causes for laughter are social.

A clue into how and why laughter began, is found in other animals. It has been shown that both rats and apes have laugh-like responses to play. Jack Panksepp and Jeff Burgdorf discovered that rats make a quiet (inaudible to the naked ear) chirping noise both when they are playing and when they are being tickled. Apes make a rhythmic panting noise when they physically play or are tickled. Usually it is far breathier than laughter, but occasionally it gains a slightly more guttural sound. It is quite possible that this was how laughter started—as a response to play and tickle. This kind of “laughter” was around far before jokes and humor.

The play type of laughter is a sign to playmates that they are in a friendly and safe interaction. When humans were prelingual, and in any species without language, laughter is a powerful and important tool. The ability to communicate that an interaction is safe facilitates physical play and tickling—which have their own evolutionary functions (they facilitate communication and bonding, first between a baby and mother, and then in many of our close relationships).

This theory of laughter’s origins considers humor to have developed much later and to play a small part in why we laugh. A study conducted by University of Maryland at Baltimore County psychology professor Robert R. Provine, consisting mostly of eavesdropping in laughter-filled places, showed that only 10-20% of “pre-laugh” comments were intended to be funny. The other 80-90% of things that people were laughing at were comments like, “Nice to meet you,” or “How are you?” These results suggest that laughter is based far less on humor than we tend to think. Laughter can be like small talk, a social thing we do to assure people of our attention or favor without having to really say anything.

For further evidence of this point, think about the last time you saw a baby laugh. Did her smiling mouth and little coos seem to be in response to humor? Did her pumping arms and legs seem to be in response to a joke? Probably not. Children don’t usually start to joke until they are 5 or 6, but they often laugh for the first time when they are around 90 days old.

To me all this is very counter intuitive. When I think about laughing it is almost always connected to something amusing. It is slightly affronting to be told that most of the time I’m not laughing for the reasons I might think I am. In trying to understand this it was helpful for me to look closely at my own experience. I tried to remember the last time I laughed when I was alone. If it was in response to some outside stimulus, like a movie or an e-mail, it doesn’t really count as being alone. My dad’s laughter
alone in his car was intentional, so this also doesn't really count. I tried to remember a time when I spontaneously laughed when I was alone. I can think of times when I let out a short, quiet, giggle, for example when I tripped over a stick on a walk. But I cannot think of a time when I really laughed alone. This is because people very rarely do. Laughter is almost entirely a social behavior.

Another theory, that laughter is a force for group unity, is also highly based on the sociality of laughter. The sounds of laughter, which are much showier than our speaking voices, are evolutionarily (not usually consciously) made to trigger positive feelings in other members of our group. It’s easy to see that laughter can bring people together. This can also play a powerful role in negative situations. Laughter is often employed for making fun of people or casting them out of a group. This too, has its own evolutionary function. It’s possible that laughter is a tool for group unity, which would have been necessary for early humans. For hunting, protection, and eventually farming and the building of governments and cities, group unity would have been essential.

The fact that laughter is highly contagious fits with this theory too. Provine (who conducted the eavesdropping experiment) thinks that it is very possible, though not certain—the possibility was deduced mostly from reasoning about the traits of laughter—that our brains have an auditory laugh detector, a neural circuit that responds only to laughter. This laugh-detector may set off a laugh-generator, which causes movements that cause the sounds that we hear as laughter. Such a mechanism could be a way to bind a group together. When one person laughs, it is hard for everyone to not laugh, causing similar feelings and actions to arise in a group.

That the sounds of laughter trigger positive feelings, and a “jolt” in our brain, does not necessarily apply only to a large group. It can also apply to interactions with just one other person. Recent studies conducted by Provine and one from the seventies conducted by the late sociologist Rose Coser, have shown that people tend to laugh much more loudly and extremely around their bosses. Similarly, women laugh more around men than they do around other women, and much more than men do around women. This could be because when someone is with their boss and when women are with males, they tend to feel dominated or threatened by the more powerful figure and they are trying to manipulate that person into feeling positively toward them. The strange noises that we call laughter probably didn't develop to be their certain brand of strange by chance. It seems quite possible, according to psychologist Jo-Anne Bachorowski, that the specific sounds of laughter trigger positive feelings.

Another theory was proposed by V.S. Ramachandran, a neurologist at UCSD. He calls this the “false alarm” theory. He believes that the main purpose of laughter is to let others know that an anomaly or a possible threat, is actually benign. He writes, “When a person strolls along a garden of expectation and there is a sudden twist at the end that entails a complete reinterpretation of the same facts, and the new interpretation has trivial rather than terrifying implications, laughter ensues.” Laughter is a signal that no harm has been done.

In the case of laughter, evolution has brought us a gift, a way of seeing out of ourselves, of feeling better.

This trivial reinterpretation is often the pattern of our jokes. Think about slapstick humor; you watch someone walk down the street and trip over her shoelace. She goes flying into the air and lands on her butt. For a moment you're very worried. Your body tenses up and you wonder if you should yell for help. But then, she calmly gets up and seems not to be in pain. The threat has been deflated. It’s common to laugh when you watch someone fall. Much comedy is based on this kind of physical humor. When you laugh you’re letting other people, and perhaps yourself know that there is nothing to worry about anymore.

A main difference between this theory and the others is that it addresses why things are funny and why funny things make us laugh, while the other theories claim that humor is not a main cause of laughter. This is an important distinction. Earlier I gave evidence for the extraneousness of humor in laughter—or how little we laugh alone and the high percentage of humorless pre-laugh comments. But there are a few possible ways around this evidence. It is possible that the reason we don’t laugh as much when we’re alone is that there is not nearly as much funny stimuli. And it’s important to remember, when considering the funniness of pre-laugh statements, the powerful significance of context.
in humor. It is possible that people were laughing about things that the observing scientists couldn’t possibly see as funny because they didn’t share a common history or knowledge with the laughing people.

I suspect that these things do play a part, that perhaps laughter today is more based on humor than the first theory presented would suggest, but certainly not entirely. It’s seems probable that laughter can come from both social and humorous stimuli. It’s hard to think that we’re almost never laughing because things are funny. We laugh at jokes all the time. It also seems probable that the social element plays a large part in why we are laughing. Some scientists think that this combination may manifest in the brain. The spontaneous laughter that results from humor may originate in the brainstem, an evolutionarily ancient part of the brain, while less spontaneous laughter—nervous, fake and entirely social laughter—may come from newer parts of the brain, such as the prefrontal cortex.

The false alarm theory could also help explain why laughter is contagious. Evolutionarily, a stereotyped vocalization, a common and innate sound, is almost always used for communication. For example, it seems obvious that a dog barks to communicate that it wants attention. A long time ago, much like a dog’s bark now, laughter may have been one of our only means of communication, and it’s communicatory purpose would probably have been just as clear. We laugh to show others that things are okay. If a message needs to be conveyed, it would definitely be helpful to have a whole group sending the message. This could explain why when we hear other people laugh, we often laugh too, and why there might be a neural circuit built into our brains to make us do this.

This theory also addresses nervous laughter. When serious or disturbing topics or events must be faced, people often giggle nervously. According to the false alarm theory, this is because we are trying to cope with our anxiety by attempting to set off our own false alarm mechanism. We want ourselves to believe that the perceived threat is actually okay, that there is nothing to worry about.

This theory makes sense. It seems like a possible answer to the questions about laughter’s origin. But then, so do the others. These theories are not straightforward and I cannot choose one and proclaim it true or false. They’re intertwined and messy. But putting aside the desire for an ultimate truth, I’ve found that it’s interesting to look at the possible origins of laughter, and in it see hints of what it means to us in our lives today.

It is fascinating to think of laughter in its primal stages, as a signal that things were safe, or a way to bind people together. That was one of the only means of communication that we had. It must have played a much different role in the lives of humans. In some ways it was probably more important, it was one of our only ways to communicate. But in some ways it also must have meant much less than it does today.

Now we experience it also as joy and in response to nuanced humor. Like my dad in the car we can intentionally manipulate laughter. Much has been added on to this once simple mechanism. It may have been given to us for one purpose, but it has transformed into something more.

In a bad mood, frustrated and sad, I was working with my teacher on this project. I asked for his help but was uncooperative and morose while he gave it. The whole day my eyes kept filling with tears, and I kept my head down and tissues in my pockets. I rarely have a day like this anymore, a humorless day, when I refuse to step out of my sadness. But this day was one, so we spent a long time talking about laughter and about how I could motivate myself to write this article. He diligently took notes to help me later. As we wound up our conversation he began to speak in a silly southern drawl. He sarcastically narrated the e-mail he was sending to me containing my notes. Involuntarily, I noticed my cheeks moving up, my mouth working its way into a small smile. I gave a small chuckle and tried to cover my mouth a little. I was not ready to stop steeping in my sadness yet, but here I was giggling ever so slightly.

Here laughter was, however slightly, opening a window for me and letting a cool breeze flow in. What I like about people and situations that make me laugh is that they don’t allow me to take anything too seriously, especially not myself.

What I’ve liked about studying laughter is that it, too, doesn’t let me take myself too seriously. Inspecting something that seems so natural, so commonplace, and looking for the complicated story behind it, can be humbling. We laugh all the time. The average adult laughs seventeen times a day. We think we know why we are laughing, we think we are in control. But here are all these studies, showing us how involuntary it is, how uncontrollable, how social it is. We look at its past and see that it is in us for evolutionary reasons, as a way to help us survive. In the case of laughter, evolution has brought us a powerful gift, a way of seeing out of ourselves and of feeling better.
THE COMPASS SCHOOL inspires and educates students to gain the knowledge, skills, and personal qualities essential to pursuing their dreams and having a positive impact on the world.
The grass is green and I am alive. The mountains reach their peaks to the sun, closer than I’ve ever seen. I work. I work for a purpose—to keep the cycle moving. I am selfless, but it makes me happy—a selfish benefit. The cows gather around me when I write. I am not a threat, merely a curiosity. The wind keeps things moving too. Mathias talks about permaculture, and I want to be a part of this cycle: Mathias, Nicole, the farm, the cows, the llamas, dark skinned women, buckets of water sloshed all over the floor. I am happy. Thinking of returning home, however, I am not. I will mourn for this self that has become one with the cycle of the land—a way of being that I can’t take with me. The isolated girl in school, at home, and downtown—the girl who was left back in the states—represents a life that is not cyclical, but linear. Work has less purpose back home because I cannot see the benefit in front of and all around me. Being in Ecuador somehow evoked an altered self—one that flowed with the movements of the land.
When external conditions manipulate one’s cognitive state and behavior, this is referred to as situationism. While many scientists believe that genetic traits dictate behavior, regardless of the circumstances, situationism suggests that this is not the case. In other words, situationism is the psychological theory that external conditions, rather than inherent cognitive neurological traits, are the main deciding factor in how beings react to situations in which they find themselves. This is what I experienced when I traveled to Ecuador on my junior class trip this past January. Before leaving, I had been on a very long run of feelings of entrapment, hopelessness, and general negativity about my place in life. I was unhappy in my situation. My outlook on life, however, changed dramatically as soon as the location and the atmosphere was altered and I found myself in a place where the sun was shining and I felt that everything had purpose.

As a part of the community at the farm, my classmates and I were each expected to perform simple tasks to help with the general upkeep of our living space. Daily chores such as cooking meals, cleaning the bathroom, mopping the bedrooms, or watering the plants were divided up into a daily schedule. In Brattleboro, VT, cleaning a toilet seemed like an extraneous and nauseating task that wasn’t vital to my survival. In Ecuador, however, dumping the waste from the composting toilet bucket was just a part of my duty as a community member. I liked doing it because I was helping keep the critical cycle of life on the farm moving. Every task contributed to the flow and function of the happy and simple life I led there. Helping out with chores was a part of that, and the work didn’t seem so tedious when I knew that the chores I was doing were simply a part of the flow of life.

My traits hadn’t changed. My brain still had the same neural connections and I was still the same physical being I was back in Vermont, yet something was definitely different. As soon as I felt the sun on my face and the grass on my bare feet, I was at peace. In the sun, I was positive and warm-hearted. Back in the snow and cold, I was pessimistic about virtually everything. Being uncomfortable in my environment made me uncomfortable in my head. I realize now that I am happiest in pleasant weather and green grass, no matter which country I’m in—Vermont woods in the summer or Ecuador in January. However, journeying to South America during the most dead and colorless time of year back home, was especially personality-altering because of the abrupt change.

Walter Mischel, the psychologist who coined the term situationism in the 1960’s and who conducted numerous studies in the field, hypothesized that personality traits and external stimuli are tightly entwined with each other. He wrote, “In general trying to separate nature and nurture makes about as much sense as trying to separate personality and situation. The two influences are completely interrelated.”

...my mind had been melded around this flowing physical space. Everything about it seemed so simple, yet vital.

His ideas contrasted with many views of other personality psychologists in behavioral psychology in the sixties. The more popular ideas of the time were behavioristic ones, which suggested that differences in neurological reactions were completely dependent on inherent traits and personality rather than the external stimuli to which an individual was exposed. Mischel claimed that personality did not have a high enough correlation to the consistency of an individual’s actions in changing situations to reliably predict behaviors.

Although personality cannot accurately determine how an individual will react in separate situations, it can predict how one will act in a series of similar situations. For example, if a person displays high energy and sociability in a group of his or her friends at one time, they are very likely to display the same actions in a similar situation at any different time. However, if this same person finds him or herself in a group of people who are not as well liked, that person may consistently act less friendly and extroverted in these situations.

Thinking about Mischel’s claim, I find myself vividly reminded of Ecuador again. These ideas strike me as fresh, yet familiar. I know I had a very different experience there than I ever had back home, but after reading about Mischel’s ideas I have some key-ins as to why. I was physically in a very distant and unusual space, and I recognized that. The landscape was lush, mountainous, and expansive. My mind followed
the contours of the rolling terrain. Feeling like such a part of the land was different than anything I was used to. Since everything around me was so peaceful and harmonious, my mind seemed to be in a place of harmony as well. The situation was mirrored in my personality.

When the Science of the Mind class visited Harvard University, one study on priming that was described to us by Adam Waytz, of the Social and Affective Cognitive Neuroscience Lab, stood out very distinctly in my mind. Waytz talked about neural priming, a form of situationism that demonstrates the power of external factors over inherent traits by exposing subliminally exposing test subjects to certain concepts.

In 1996, psychologists John Bargh, Mark Chen, and Lara Burrows completed a study at New York University to test the effects of neural priming with words associated with specific stereotypes. The subjects were not told of the true intention of the study, only that they were participating in a test that involved unscrambling sentences. One group’s sentences had words that were associated with the elderly (such as grey, Florida, and bingo) sprinkled throughout their sentences, while the control group was exposed to words with a neutral association (such as clean, thirsty, and private.) After each participant had unscrambled all the sentences, the experimenters timed them as they walked back to the elevator. The results showed that the individuals in the group who were subconsciously exposed to the “elderly” words consistently walked at a slower pace than those of the control group.

Even though these people were neither elderly nor conscious of the fact that they had been exposed to carefully chosen words that evoked thoughts of the elderly, they exhibited traits of people many years older than themselves. The mind had soaked up these subconscious primes and internalized the situation, overriding the inherent trait to walk at a normal pace. If the subjects receive stimuli related to older, slower, and frailer individuals, they tend to internalize these stimuli and act them out. But why do these temporary situations influence behavior, even to the point of overriding what seem to be inherent traits?

As I look back on my experience in Ecuador through the filter of situationism, I can remember having a realization about my mental state. I sat cross-legged in the middle of a hilltop pasture overlooking the farm buildings. A warm breeze and the smell of lush crops brought a sense of peace. I saw suddenly how my mind was melding with the farmscape. Everything about my simple surroundings imbued me with vitality. I became a being with a sense of fulfillment because I was immersed in a working agricultural environment that was so rich with purpose.

As I take a moment to notice my situation now, I see how I am influenced by external factors. I realize that I still have a sense of self, but the foundations of my reactions are built on the external stimuli I take in day in and day out.

Situationism is a profound theory for me because the knowledge that placing myself in a physical environment that is more conducive to happiness, has given me a more open perspective on my life and where I end up. If I am unhappy, I can lie in the grass or talk to people who I am usually happy around. If I need to find a sense of calmness, I can simply take a walk in the woods. I can close my eyes and place myself back in Ecuador. Now, not only will these methods help readjust my state of mind, but I will also have a sense of why I feel less than content, and what can make me feel better. As long as I place myself in the right situation, I can be in a healthy and purposeful state of mind.
THE SCIENCE OF
a sleeping teenager

BY ARIEL TEMPLE

It literally hurts to keep my eyes open. I have to hold my lids up with my fingers. I can’t concentrate on the Romans right now. All I can think about is my bed at home, with the giant warm comforter. My head hurts from the florescent light. I look at the clock above the white board. How can it only be 7:35 am? I swear class started more than ten minutes go. Putting my head down on my desk is so tempting; I could just settle down on my text book and... wait! What was that the teacher just said about a test tomorrow? Don’t they count for 60% of our grade? Did we even learn this stuff? Oh crap.

Does this story sound familiar? This is how many teenagers feel during their first period class. The average public high school starts at 7:25 a.m. Students are dragging themselves through the halls like zombies. It’s a matter of luck as to whether they make it to class on time. Now, one might think that’s not so early, but lets consider what happens before they get to school. If a student lives locally, he only has to wake up at 6:30 am to get to school on time — that is if he doesn’t shower and has already laid out all their stuff the night before. But if a student wishes to be clean or is indecisive about what he wants to wear, he would have to wake up closer to 6:00 a.m. More importantly, however, if this student happens to live in a far away town, he would have to factor in commute time. This schedule is making teens sick. With homework and hormones, adolescents typically don’t get to bed before 10:00 or 11:00 p.m.—giving them a grand total of six to seven hours of sleep.

To be working at their best, teenagers need a minimum of nine and a quarter hours of sleep. Without this, much is compromised, including good grades and health. In order to understand the full implications of this problem, it is important to understand the teen sleep cycle and the side effects of not getting enough sleep.
On average, a teen isn’t able to fall asleep before 10:00 p.m., and in fact, most go to bed at eleven or twelve at night. If given the opportunity, the majority of teens would sleep until eight or nine in the morning. Adults, however, can fall asleep as early as eight or nine and are able to rise fully refreshed at 6:30 or 7:00 am.

One of the main differences between adult and teen sleep cycles is hormones. When teenagers go through puberty all their hormones get mixed up, including the one that controls sleep behavior. Melatonin, produced by the pea size pineal gland in the midbrain just outside the blood-brain barrier, makes people drowsy and lowers their body temperature. Melatonin is regularly secreted at a certain time at night and then stops secreting after about eight hours for adults, and nine and a half hours for teens. In adolescents, melatonin levels don’t start rising until 11:30 p.m., whereas adult levels start rising around eight thirty at night. Side effects of sleep
deprivation are serious. The body uses the time when a person sleeps to regenerate; it uses this as a time to build up the immune system, remove waste products from the nervous system, grow cells throughout the body, secrete hormones that regulate appetite, and move memories from short term to long term.

What would happen if my school day started at 10:30 a.m. and ended at 4:00 p.m.? Would I be healthier and less grouchy? Might my teachers seem less evil?

Not getting enough sleep can run a teen down and make it easier to catch a virus. If a teen is so tired that he can't pay attention in class, his grades will suffer. A student can even get sick from not sleeping, which means missing school. And most public schools are very unforgiving when students miss class.

School schedules are developed by the teachers and principals of a school. There are so many different types of computer applications online to help teachers plan. Hardly any even consider the option of starting before eight in the morning.

Imagine the following scene: two friends are having a late night study session and are having trouble staying awake. They each down a couple of diet Pepsi's, but that doesn't work. Then, one remembers that she brought, Modafinil, which her doctor prescribed for her ADHD, but which is more commonly used by adults who suffer from narcolepsy and other sleep disorders. The students pop a couple pills each, unaware that extended sleeplessness can cause psychosis, which includes symptoms as serious as hallucinations, delusions, uncontrollable anger, and depression.

Over the years, many people have vied for the record time gone without sleep. Tony Wright, who believes eating a diet of raw foods lowers the need for sleep, claims to have set a record of eleven days without sleep in 2007. During the stint, Wright kept a blog for the BBC. Around the third day he reported that he saw fairies and dancing elves. The Guinness Book of World Records, which used to include a sleepless record set in 1964, decided to stop acknowledging the category because of the risks extended sleeplessness imposes on one's health.

What would happen if my school day started at 10:30 a.m. and ended at 4:00 p.m.? Would I be healthier and less grouchy? Might my teachers seem less evil? Perhaps I'd have better grades.

If school did start later in the day, this is what my day might look like: The sun is shining as I stretch and jump out of bed. I eat breakfast, brush my teeth, and head off to school. First block is great, and second block I'm still awake and energized. Lunch offers time to go outside and absorb more vitamin D. Third block I'm back in the classroom yet surprisingly alert.

When I get home I don't even need to take a nap. I can get right to my homework after I eat dinner. At this rate, I am done by 8:30 p.m. in time to watch my favorite T.V. show. With my new school schedule, I can actually stay up until ten and still get enough sleep. I can fully concentrate on everything I do, and my grades have improved as a result. It's really amazing what a good night's sleep has done to help my life.
It was clear that we were talking to a real expert, as we were shown images taken by famous researchers within the field of Neurology, and our questions were answered with the depth of someone who has studied the topic for years.
It was clear that we were talking to a real expert as we were shown images taken by famous researchers within the field of Neurology and our questions were answered with the depth of someone who has studied the topic for years.

I couldn’t believe it. I was holding a real human brain. Decked out in a white lab coat and latex gloves, this small lump containing neurons and grey matter felt surprisingly heavy in my hands.

At Harvard’s McLean Hospital on a Friday morning, the students of the Science of the Mind class stood before a table that was laid out with tan colored brains of different sizes and cuts, all smelling of hospitals and formaldehyde.

Dr. Timothy Wheelock, the assistant director of neuropathology at The Harvard Brain Bank, smiled and said, “Welcome. Feel free to pick up anything on this table and ask questions.”

Dr. Wheelock carefully handled each brain and explained the differences between them. There were several fully intact brains. One had belonged to a patient with Alzheimer’s, another had been affected by Huntington’s disease, and the third brain had been through a fatal car crash. This bruised and swollen brain made me think twice about driving safely.

The table included many other things to look over, including different cuts of brains (to reveal specific parts of the interior of the brain), the spinal cord, the dura mater, and pia mater (two protective layers that cushion the brain from injury and provide nutrients.)

The hour flew by as I puzzled over particular parts of each brain and marveled over the little details each one contained. There were many moments of revelation in which I realized how all the parts of the brain fit together. When I picked up the interior of the cerebellum, which looked like millions of little branches, or handled the small optic nerves, like little tubes, I could clearly understand how to solve the brain’s complicated puzzle of parts. It was exciting to be learning science in such a hands-on way. I felt like a child who had just solved a difficult
jigsaw puzzle. There was something about holding a brain in my own hands that made me think about these intricate structures more than any exam or lecture could.

I felt as though I were in a science fiction movie.

About an hour later, Dr. Wheelock called us together. The lights were turned down and we gathered at his personal lab computer for a longer question and answer session.

Through PowerPoint slides of images of brains and photographs taken with microscope photo imaging, we learned about the way that cancers, Alzheimer’s, and Huntington’s disease take over the body and brain.

It was clear that we were talking to a real expert as we were shown images taken by famous researchers within the field of Neurology, and had our questions were answered with the depth of someone who has studied the topic for years.

Lastly, we were given a tour of the Harvard Brain Bank’s facilities and learned how they collect and export human brain tissue to neurologists all over the world for research. Human brains are an important step when studying the effects of degenerative diseases, so places like the Brain Bank are essential to researchers.

We walked through the eerie Brain Library, a room housing many cuts of different brains, all neatly labeled and placed on shelves like books. Next was the Freezer Room, where important specimens must be stored at below zero degrees at all times. When we entered the room where brains are preserved and cut with precision, I felt as though I was in a science fiction movie.

After we said our good-byes and exchanged thank you’s, I still could picture that brain in the palm of my hand, with all its fragility and strangeness.

As I walked out the door and into the cold March air, I knew that this is an important research center which has the chance to inform neuroscience research all over the world. Perhaps one of the brains I had held in my hands could unlock the secrets of Alzheimer’s or brain cancer.
Students were given 2 1/2 weeks to write a comprehensive journal article on a topic of their choice that included one piece of original artwork.

In addition, they were asked to take on one more aspect of the publishing process (editing, writing a short column, cover art, etc.).

Their articles had to include both humanities and science related content—they were asked to address both the subjective experience of the mind and the objective, scientific, and anatomical view of the brain.

In order to help with this process, they had to contact and interview one to three experts in the field of their topic and submit all emails and correspondence. They were asked to use at least one primary source from a peer reviewed journal.

We asked students to incorporate a personal, reflective component and reference topics that we covered in class and on trips. We encouraged them to begin with a personal hook or start with writing based on first hand interviews or a good reconstruction.

We wanted them to try and write from the lens of the first person and be imaginative. The more converging pieces of evidence students included to explain a phenomenon, using a variety of epistemological methods, the better.

Many were inspired by the assignment and went far beyond the course requirements to produce an informative and entertaining journal that can reach a much wider audience than just their teachers.
WE WERE lucky enough to have reporter Colleen Walsh and photographer Stephanie Mitchell from the Harvard Gazette accompany us to several of the neuroscience labs in Cambridge. Walsh and Mitchell seemed to really understand the importance of reporting on this type of educational model. Hopefully, Walsh’s article will inspire other science educators not only to experiment with student-expert collaboration, but also to consider adding brain and mind studies to their curriculum.
A ‘mind-blowing’ day

Vermont high school students explore the human brain, with help from Harvard scholars.

By Colleen Walsh | Harvard Staff Writer

On a recent early-morning field trip, Kyle Takei appeared surprisingly awake for a typical high school teenager.

Wide-eyed and bouncing in place, the 18-year-old, who had traveled from Vermont to the Harvard Brain Tissue Resource Center at McLean Hospital in Belmont, Mass., was eager to hold something special: a human brain.

After a brief introduction and comments from Tim Wheelock, the center’s assistant director in neuropathology, Takei donned a Tyvek gown and latex gloves and picked up one of several cerebral specimens on the steel table before him.

Without even a hint of irony, the awestruck teen called it “mind-blowing.”

“It’s hard to believe that this 1,000-gram hunk of stuff is what controls everything,” he said. “At one point, this was some guy’s brain, and he had thoughts and dreams, but now it’s being studied by me.”

Takei was part of a high school class trip coordinated with the help of Adi Flesher, a master’s student at the Harvard Graduate School of Education (HGSE).

Flesher is pursuing her degree in the School’s Mind, Brain, and Education program, an interdisciplinary, one-year sequence that connects the study of cognition, neuroscience, and educational practice.

“Just really got interested in talking with kids about their minds,” said Flesher, a former assistant director of a summer camp who became increasingly fascinated with how and what his young campers thought after hearing them discuss their own struggles with attention deficit and obsessive compulsive disorders.

“We take 16-year-olds and teach them about a car so that they can drive. There’s driver’s ed, but there’s no brain ed,” said Flesher. “If you think about it, the study of the brain is a much more basic and important part of human life that we don’t really address in any formal way in the education system.”

When his brother Amir, a teacher at the Compass School in Vermont, needed to help develop an interdisciplinary elective class, one that could rival the school’s established filmmaking course in popularity, he looked to Adi for inspiration.

In exploring what to study, Amir and fellow teacher Beth White brainstormed with their students on possible topics. In the end, the brain was the top vote getter. With help and suggestions from the students and input from Adi, the teachers combined the science and psychology of the brain into a class they call “The Science of the Kind.”

The course is a series of workshops divided into a humanities component — where the teens study such diverse areas as Buddhist psychology, Plato’s “Parable of the Cave,” and the psychological dimensions of the science fiction film “The Matrix” — and a science section, where they study the anatomy and mechanics of the human brain.

As a final project, students write an academic article on a mind or brain topic for inclusion in their own scientific journal.

The class culminated last week’s outing to neuroscience, psychology, and education labs around the University. This is the second trip to Harvard for the high school class. The first group of Compass students visited in 2008 when the course was in its pilot phase.

Though Amir and White coordinated the first excursion, they were able to use Adi’s Harvard connections to broaden the scope of this year’s visit.

The students listened intently on March 25 as Joshua Greene explained how the brain engages in moral reasoning.

Greene, an assistant professor in the Department of Psychology who directs Harvard’s Moral Cognition Lab, discussed how he uses neuroimaging to explore how the brain reacts to the “trolley problem,” an ethical dilemma that asks if it is morally acceptable to throw a switch that will guide an errant trolley onto a track, killing one trapped person, but saving five others trapped along the track’s first section.

Arid Temple, 17, said of Greene’s research, “I just love challenging my mind with those hypotheticals. What would I do, what’s moral, what’s not. All that kind of stuff. It just finds its own fun.”

Later that day, the group visited HGSE’s Project Zero, where the students offered themselves up as test subjects for master’s candidates developing experiments around how people think about the concept of emergence, and video games aimed at helping students learn about science.

For the youngest member of the expedition, handling human brains was challenging.

“The thought that holding somebody’s brain in your hands is [holding] everything that made them who they were, their thoughts, their memories, their life story — that’s a bit to take in,” said Meghan McGowan.

Still, the 16-year-old was thrilled to meet Greene, the author of a paper on moral reasoning that she read prior to the trip.

“I read it like seven times, and thought ‘this is so cool!’ Come to find out yesterday, the guy who wrote it, we met.”

Flesher and her brother are now exploring ways to bring the brain class to more students, in part through summer camp programs, and by developing a teaching model that can be used by other schools.

“Our ultimate hope,” said Adi, “is to get more kids engaged in this kind of cool learning.”

Photos by Stephanie Mitchell | Harvard Staff Photographer
A little girl falls and scrapes the skin off her knee. It hurts a lot and she runs to her mother with tears in her eyes. Almost as if it were magic, she stops crying when her mother gently covers the cut with a Care Bear Band-Aid. As soon as the band-aid is in place, she feels better. Most children benefit from the placebo effect because they think they're getting “medicine” for their boo-boo with Band-Aids, kisses, and hugs. Scientists are continually amazed by the degree of significant improvements that people with actual ailments experience when they’re told the sugar pill or saline treatment they are taking is actual medication.

Using a variety of epistomological methods the placebo effect was officially discovered during the testing of experimental drugs. When investigating the effectiveness of medicine or therapies, scientists normally have two groups of test subjects; one group gets the actual medication or treatment, the other one gets the placebo that doesn’t do anything. (Early on, scientists used sugar pills; now the term “sugar pills” often refers to the placebo effect.) In the experiments, both the test subjects and the researchers agree not to know which type of medicine they receive, as to not affect the results. These types of tests are known as double blind. Researchers are essentially testing the effects of the medicine as compared to the placebo. The experiments that were initially designed to prevent dangerous and ineffective medication from being put on the market ended up shedding some light on the power of suggestion and its role in healing.

Ever since there was medicine, humans have been using the placebo effect to help the sick. Many ancient healing methods involved tricking the patient into good health. Ancient rituals for healing took full advantage of the placebo effect. Chasing evil spirits away with bells, chanting, and other traditional methods have never been scientifically proven to heal, but in order for the treatment to be effective, the patient must truly believe in the ritual. For example, in World War II, when an anesthetist ran out of morphine, he observed that salt water injections alleviated the pain and shock only when the patient was told he was receiving morphine; this is an example of mind over body.

Currently, pharmaceutical companies have started closely examining the placebo effect, as it appears to be getting stronger.

In England, in 1952, Dr. Albert Mason hypnotized his patients and told them that their sickness would disappear. This method worked inconsistently, though it seemed to somehow help people who wanted a cure for warts. One day, a child, covered head to foot in warts, came to him looking to be healed. Under
hypnosis, Dr. Mason told the boy that all the warts on his left arm would disappear. Within a week they were gone. It was discovered later by physicians that the boy suffered from an incurable skin disease. Is it possible, therefore, to cure nearly everything using this method?

It’s ironic that placebos have been used almost exclusively as alternates to testing new drugs and treatments, rather than for their unique ability to be medicine. Are placebos not a viable solution to a number of disorders and illnesses? In 2007, Tor Wagner, of Columbia University, smeared two placebo creams on a person’s arm in an experiment. The tester told the patients that one of the creams on one arm was a “painkiller” and the other, a placebo. Wagner followed this by burning the patient’s skin in the creamed covered areas. Researchers found that patients reported less pain and fewer burns in the area of the “painkiller cream” than the placebo when, in fact, they were exactly the same cream. Scientists are still puzzled as to how the use of the placebo changed the reaction of the test subject’s bodies. Is the placebo effect powerful enough to prevent or weaken the effect of burns?

Currently, pharmaceutical companies have started closely examining the placebo effect, as it appears to be getting stronger. Some recently publicized research in Newsweek on the effectiveness (or lack thereof) of anti-depression medication has shown that in a significant number of cases, the placebo actually worked better than the medication. This is only one of many experiments being conducted that prove that the placebo effect has an almost magical way of unleashing the brain’s own healing power.

Some researchers even credit the placebo effect for the positive results from self-help books. Do people get better because of techniques the book is suggesting, or is it because the mind believes in the positive effects of the book? Americans spend $11 billion a year on self-help books because they think this will help them improve
their lives. So, are they in essence buying a placebo effect?

Would it be possible to set up a medical system that would allow placebos to become a more mainstream therapy? Could placebos become a more powerful, controlled healing tool? They have no side effects, unlike many medications, and with the increase in the placebo effectiveness, researchers have been considering placebos as a viable treatment alternative to traditional therapies and medication.

Why are placebos so powerful? Some reasons might be because of the change in society’s trust in pharmaceutical companies, their research, and the power of medication. Perhaps placebos work simply because something is being done to address the problem, and this might be triggering the body or mind to fix itself. The mind body connection remains a mystery.

Unfortunately, in our litigious modern world, tricking people into believing they’re taking medicine or undergoing therapy isn’t legal. This method requires trusted physicians to essentially lie.

After Dr. Mason’s patient with the incurable skin disease was brought before the Royal Society of Medicine (RSM), the physician was scolded. The RSM’s president told the doctor that it was absurd and impossible for the child to have been cured and questioned him as to why only one arm would be affected. In his own defense, Dr. Mason said he was never able to remove the rest of the skin disease because the both his and the child’s confidence had been shaken. In order for a placebo to work, both the patient and doctors must believe in it; doctors must deceive both themselves and their patients.

Unfortunately, in our litigious modern world, tricking people into believing they’re taking medicine or undergoing therapy isn’t legal. This method requires trusted physicians to essentially lie. Modern medicine is founded on the Hippocratic oath that doctors will do no harm. Knowingly prescribing an inactive medication is considered unethical; it might not work and a patient may become more ill (although, no one can be 100% sure of the healing power of any drug on any one person). After all, in order for this to work, a patient must voluntarily enter a study where he or she knows that it is a real possibility that the medication received may be a placebo.

The placebo effect continues to amaze scientists, doctors, and researchers. Its effectiveness has been proven over history. Using placebos in place of questionable medications could save money, eliminate side effects, and could theoretically be used to cure a wide variety of ailments. But, using placebo in the place of standard medication and treatments is hard to control and requires a whole restructuring of our modern medical system. Researchers are still trying to find out how we could organize a medical system that would harness the power of the placebo effect. It will be interesting to see what comes of this powerful phenomenon.
n front of me is a piece of paper, with no writing on it, only margins crammed with doodles running up and down the page. In my hand is a pencil, covered in deep teeth marks. Around me, students are diligently bent over their papers, pencils in hand, scribbling whatever thoughts the teacher wanted us to write. Everything is in place for me to begin to dump my thoughts out onto a piece of paper.

Yet, in my head a battle rages. Thoughts are pumped out by my mind, each one vying for my attention, which rapidly moves between my internal world and the world around me. Comic books, story ideas, whatever I’m going to have for lunch and *Star Wars* all bounce around my head at mock speed, only to die just as abruptly as they appeared. My mind changes gears countless times per second. I notice that every scratch of a pencil and every small noise made by the rest of the class clogs my mind with excess stimuli. What kind of drugs am I on? The answer is: none. I am on no drugs; no foreign substances have influenced me. This is how I perceive the world every day, every second that I’m awake.

It didn’t help that I wasn’t diagnosed with ADHD until I was in 8th grade. Up until that point, all of my teachers thought that I was just being lazy, and that if I really wanted to, I could succeed just as well as the rest of the class. It took what seemed like weeks to be methodically tested by the state of Vermont, so that I
could finally have a 504 plan that took into account my spacey tendencies. It was weird, but being told that I was ADHD-predominantly inattentive, otherwise known as ADD, was a relief, because now I knew that there actually was something wrong with me, as opposed to being so lazy that I couldn't even organize myself without help.

Tell tale symptoms of ADHD, such as poor attention, concentration and task completion skills, are nearly identical to some of the major symptoms of depression, anxiety disorders, bipolar disorder, drug addiction, and other personality disorders.

As I got older, I noticed that the symptoms became less and less overt. Out of curiosity, I decided to investigate what forms ADHD could take when I reach adulthood. To my surprise, I discovered that there is exponentially less information on adult ADHD compared to its childhood form. In fact, there isn't even a “Gold Standard” of a diagnosis which is used in every case; the diagnosis methods we do have contradict each other.

There are only a few factors that most methods of diagnosis share. One of them is that the psychologists will look into the patient’s school records, dating back to around age seven, to find a history of ADHD symptoms. Also, questions about the patient’s life are asked, to provide a subjective look at how their lives are, or as the case may be, are not affected by ADHD. Somebody close to the patient, such as a parent, wife/husband or a childhood friend is brought in to provide an outside perspective on the patient’s symptoms, to correlate or provide more information on the patient’s life.

The problem with diagnosing adult ADHD, however, is that the major symptoms of ADHD manifest differently after around age 18. There are many reasons for this, but mainly it’s because the prefrontal cortex, which plays a key role in controlling judgment, and the other parts of the cortex which control judgment and movement finally achieve peak thickness. While those parts of the brain were lagging behind during childhood, at the onset of adulthood, they have finally caught up with the rest of the brain, eliminating the problem for about half of ADHD sufferers. For the remaining patients, the symptoms manifest differently; generally, they are lessened compared to their childhood symptoms. Most prominently, an adult with ADHD is not nearly as hyperactive as he or she used to be. While people with adult ADHD may have trouble sitting still, they won't feel the urge to run around at the slightest provocation, or they just become better at controlling these impulses. The “on-the-go” mentality which characterized their childhood will often change as a result of the reduced hyperactivity, manifesting itself as a constant restlessness or an inability to relax. The disorganization problems that plagued their childhood will also extend to not only their work, but also to social commitments and deadlines.

I know that in my case, as I got older it became much easier to focus on what I was supposed to be doing. I no longer felt the urge to walk around the room when in the middle of class, which was a boon to my teachers. On the other hand, I’ve found that while some symptoms of my ADD were lessened, they were
still very noticeable. I still have trouble standing still; if I’m not moving from point A to point B, I am pacing back and forth in a very small area. And while I am much better at focusing on what I’m supposed to be doing, I still am very bad at remembering when work is supposed to be turned in. It doesn’t help matters that adult ADHD manifests itself remarkably similarly to other common psychological disorders. The tell tale symptoms of ADHD, such as poor attention, concentration and task completion skills, are nearly identical to some of the major symptoms of depression, anxiety disorders, bipolar disorder, drug addiction, and other personality disorders. In fact, people who have ADHD are statistically more likely to suffer from depression or drug addiction. While it may just be a case of correlation, with no actual connections between them, there could be an underlying connection between adult ADHD and these other disorders. Patients with ADHD are aware of something being wrong with them, and without diagnosis or treatment, they could tumble downward into depression, because they are able to see they have a problem, but can’t seem to do anything about it. The drug addiction could come from the same source as depression, as a coping mechanism for feeling like there’s something wrong.

One consistent factor with adult ADHD and childhood ADHD is how both disorders are treated, once diagnosis is complete. Well known drugs like Ritalin and Cylert are prescribed to counteract the symptoms of ADHD. These drugs are stimulants, in the same vein as caffeine and methamphetamine, and for most people they simulate the release of dopamine, creating a rush of energy and happiness. However, for patients with ADHD, these stimulants “calm down” the patient, because a patient with ADHD actually has lower than average dopamine levels, and the addition of a stimulant brings it back up to normal levels. The problem with these drugs is that while they affect the parts of the brain that pertain to focus and hyperactivity, they don’t affect the prefrontal cortex, which affects judgment; in essence, they change nothing about the judgment problems already present in the patient, only the attention problems. This leads to cases of ADHD patients being able to write long essays, but on topics they weren’t supposed to write about. It’s up to the patient to choose whether or not medications should be necessary. Some people may not be able to live a normal life without medications to keep their minds in check.

For myself and many others, the side effects of the drugs aren’t worth the few benefits that may come from taking them. I found that the most prominent side effect was a reduced appetite, meaning that I wasn’t hungry when lunch time rolled around. This was especially bad because at the time I was taking the medication, I was also doing cross country running. Not eating for 10 hours and doing sports led to intense fatigue. I found it easier to force myself to pay attention, to use outside reminders and computer organizational techniques than to adjust to the drugs. The more information I had on ADHD, the easier it was to create strategies to counteract it. In fact, the techniques I use in photography, (namely constantly tinkering and changing the photograph, before the first picture is even finished developing), was created by taking advantage of my short attention span.
UGLY ART

evolutionary biology

I'll stop when I can't find it

Not the same

I'll do it another way

MORALS MATHS
MORE SENSE
NOW!

MATTER

I also knew about evolution when I am young

MUSIC

IS FILLING ME UP RIGHT

IT NEW

Able

Please don't make me write about things I

Love. Please please please please please

there is one main thing in my head

Circumstances don't bother me if its

Authentic then maybe

Its not

Huge

Today I ran through the words. I felt like I could do

Most feel my animal self. I was happy and it was

Perfect weather. SO Beautiful exciting but my brain still wouldn't
Okay, I’ll try. Mostly I’ll try so that I feel productive and don’t hate myself.

I love evolutionary psychology. It makes so much sense. It changes things. I feel like it is my religion. People can seem so mysterious and terrible and beautiful. I guess they still are. But I have more understanding. A lot of the time I just think about but what boys and me and I replay things over and over. But I also think about evolutionary psychology at the same time (sometimes when I make art or write). It’s like I’ve sounded but I haven’t. It’s great. I try to find evolutionary psychology explanations for everything. And sometimes I even think I can do it. I love what Josh Greene and Eddy Cuismom came up with. It fits me up, like music, but in the brainy part of my brain. It’s really beautiful because it’s so f*cking smart. But accessible and it makes sense.

Evolutionary psychology changes the way I look at myself and other people. Two examples: 0) Morals are in us because they are philosophical bullshit. Because it works. Think about it. 0) We were made to survive, NOT to BE HAPPY. That is why we aren’t happy. They don’t really go together.

I have this thing buzzing around in my head that I thought ready for me to understand. I fancied a boophone in the way I was thinking about it this morning. I was doing Purvis’s thinking. I want to be able to use this as my short article because this is the only way I ever want to write like I’m here. But I’m sure that can’t. This is about the Moral Cognition Lab. Really!
HAPPINESS & YOUR BRAIN
discoveries in the science of joy

BY SARA LEPKOFF

It’s a warm spring day. Sitting in the sun, I can feel that my body is light and my mind is excitedly buzzing with positive thoughts. With every breath I take, I feel such a sense of calm and connection to the world around me. I am truly happy.

What exactly is this feeling called happiness? Amir Flesher, humanities teacher at Compass School describes it as, “A feeling of being settled and a visceral sense of lightness.” My father, Jesse Lepkoff says happiness is, “A feeling of abundance, spiritually and in the material world.” Eric Rhomberg, a science teacher at Compass School calls it, “A feeling of vibration and energy.”

The brain can be split up into different sections that manage specific functions. The key areas that affect happiness lie in the prefrontal cortex and the midbrain, or the limbic system. Within this brain area, which regulates the functions of emotion, memory, and certain autonomic systems lies “the reward circuit.”

Imagine this: You are in the absolute center of the brain, what is called the VTA. Groups of neurons surround you, receiving and giving information about how well human needs are being met. There are flashes and the air is electric with energy. The brain has just received a sensory stimulus! It seems that George, the name of the person whose body you are occupying, has just bitten into a scrumptious piece of chocolate.

Neurons are activated, and the levels of dopamine and endorphins are rising. You can see the molecules of neurotransmitters racing down the reward highway and spreading out towards a collection of neurons called the nucleus accumbens. Suddenly, they veer off, heading to the almond shaped amygdala, then to the septum, and finally they arrive at the pre-frontal cortex, located behind the forehead.

Dopamine and endorphins are the two most important chemicals, or neurotransmitters, related to a feeling of joy. Endorphins are released to suppress pain, but also show up with actions like eating chocolate, laughing, smiling, social interactions, and exercise. Dopamine, a related neurotransmitter, helps to control the body’s movement, but is also key to feeling pleasure. These two molecules are interlinked, as a rise in endorphins can also cause a rise in dopamine in some instances.

The concept of happiness is complex. In the past century, key studies in psychology and neurology have helped broaden our scientific understanding of this elusive feeling.

Due to advances in brain mapping technologies, especially machines like Magnetic Resentence Imaging (MRI) and Positron Emission Tomography (PET), scientists can now pinpoint exactly what regions of the brain control happiness. While there are many studies, a few key experiments are important to mention.

For much of medical history, it was thought that there was one center for all emotions. Dr. Mark George, at the National Institute for Mental Health, published a report in the 1990s, revealing that different brain regions are activated, depending on which emotion is involved. Using brain-mapping technologies, Dr. George, discovered that when test subjects felt positive emotions, there was a decrease in activity in the centers that regulate complex planning. Surprisingly, the amygdala,
which is often thought to be a hotspot for all emotions, only responded slightly to feelings of contentment. Antonio Damasio, a professor of neuroscience at the University of Southern California, also used MRI and PET mapping technology to illuminate the mysteries of the brain. Through analyzing photographs of the brain, his research team was able to determine that the two sides of the brain react differently to key emotions such as happiness or sadness. Feelings of happiness were associated with activation of the right posterior cingular gyrus, left insula, and right secondary sensorimotor cortex while sadness, was correlated to activity in the pons and basal ganglia. Diener’s data showed that people in their 40’s tended to be less happy than their older counterparts.

One of the first studies before brain mapping technologies that illuminated the areas of our brain most affected by happiness was the “pleasure button” experiment. The experiment was carried out by two American psychologists, James Old and Peter Milner, at McGill University in 1950. The experimenters hooked electrodes to certain areas in the brains of rats, which when activated, would send a pulse of electricity every time they pressed a lever inside their cage. These rats were so deeply affected by the presence of the electrodes that they would go to any lengths to press the lever and would activate it continually if they could. Old and Milner determined that the most active area of the brain during this experiment was the nucleus accumbens. This has since
been proven to regulate smiling, laughter, and happiness. Humans are constantly striving to be happy. Just like the rats that want to endlessly press the lever, humans seek satisfaction.

Science has taught us a few important lessons on what really does contribute to what makes us happy. Many people believe that having more money will lead to greater contentment. One famous study by Ed Diener, of the University of Illinois, states that after one’s basic needs are met, more money does nothing to raise levels of happiness.

There is a tendency in society to idealize one’s youth as a wild and fun time, whereas the thought of getting older stimulates feelings of fear and trepidation. A team of researchers at the University of Edinburgh discovered that, on average, people become more happy as they get older. Surveying more than 2 million people in 70 different countries, these results were based on people’s self-determined definition of happiness.

Diener’s data showed that people in their 40s tended to be less happy than their older counterparts, and from age 50 on, happiness trends upward. Not surprisingly, they also found that older study participants were less worried and nervous than younger test-takers.

Other research by Susan Charles, from the University of California, supports Diener’s findings. Charles measured the overall trends of contentment in three groups of people over a 23-year period. Overall, her results showed that the youngest group had a fairly stable level of happiness, the middle-aged group was the least happy overall, and the oldest group had the highest level of happiness. Negative mood trends fell significantly with age in every test.

There are no universal ways to ensure happiness. Science and psychology have investigated the matter, but ultimately, happiness is a bit of a mystery. There are simple things that people can do to increase happiness. Many doctors prescribe regular exercise, being around others, and being engaged in meaningful projects as antidotes for the blues.

It is important to understand that it is natural in the course of a week for the body to swing between different emotions. There are often cycles or internal shifts in hormones that unconsciously create depression or a lack of joy. These emotions rise and then recede. It’s all part of a natural cycle.

The soft spring breeze swirls around my face. My mind is racing with hope and self confidence. The energy of this joyous feeling is strong and seemingly endless, as though the lightness will carry me through the whole day. In the back of my mind, I know this feeling is too perfect. The day will bring highs and lows, but I store that thought away as I continue to bask in the peaceful moment as well as the brilliant morning sun. I am happy.
Donned in a white Tyvek lab coat and latex gloves, he gingerly transfers the mass of folded gyri and sulci from one hand to the other while inspecting carefully, his face in awe. The neurologist’s voice is soft and friendly as he explains that the brain Kyle is holding was from a man who had ADHD. This peeks his attention and his eyes light up. “Wow,” he softly sighs and takes a closer look, “I wonder if my brain looks like this?” Kyle has waited two years for this field trip to the Harvard Brain Bank.

The great John Dewey believed that we ‘learn best what we live,’ —in order for one to delve into deeper understandings of subject matter and be able to navigate through ambiguous or complex situations smoothly, it is best to build upon and draw from first-hand experiences. Comparing the hemisphere he is holding to the one in Dr. Wheelock’s hands, Kyle can’t notice anything different. “Exactly,” says the neuroscientist as he searches for other specimens, “There’s also one here that was diagnosed schizophrenia, but unless I look on my cheat sheet, I wouldn’t be able to tell you which one it is because the nuances are so small.”

One of my professional goals is to continue to push the edge of learning, not only within my classroom but throughout the educational world, by creating authentic opportunities and assignments that are both meaningful and engaging.

Imagine being in a school that actively promotes awareness between the brain, body and mind. There, you walk into a room of 11-12th grade students and find them all lying on the floor, eyes closed, breathing steadily as their teacher recites a guided meditation that encourages them to engage with their mind on a deep and personal level.

An hour and a half later, these same students are in latex gloves dissecting the brains of a sheep, alongside a Dartmouth College Evolutionary Biology professor, in preparation for their field trip to Harvard’s Brain Bank, where, in a week's time, they will be holding human brain tissue. This is what we do at Compass School. Nearly everyday, educators here ask how we can meet the Coalition of Essential School’s Principle goal of helping young people learn to use their minds’ well.

By connecting Kyle to researchers like Dr. Tim Wheelock at the Harvard Brain Tissue Resource center or Dr. Matthew Schneps at the Laboratory for Visual Learning Harvard-Smithsonian Center for Astrophysics, he has access to the latest research on his chosen topic for our science class, ADD/ADHD. The heart of my educational philosophy is seated in facilitating these types of learning opportunities for students like Kyle—to create environments where students can learn what they live in an experiential way, while offering tools, support, and a safe space to scaffold such learning.

We hopefully inspired our students to shine a light on the mysterious universe of the human brain.

This type of educational ‘formula’ requires careful cultivation of relationships with community partners as well as with students, staff, faculty, and parents.
In order for teachers and students to find deeper meaning in their education and lives, it is imperative that schools intentionally begin structuring classes that focus on the exploration, nature, and workings of the brain and mind. Two years ago, after being faced with designing a curriculum to rival the popular Compass School Film Class, Amir and I set out to co-design an interdisciplinary series of classes, field activities, and explorations aimed at uncovering these neurological and psychological mysteries. The goal of our course was to inspire each participant to understand the relationship between their brain, mind, and body in order to improve the way they live, learn, and think. On a more broad level, we hoped to help individuals realize the potential they have to make positive life decisions through understanding the inter connectedness of thought and neuroscience.

Every two years, students learn about their brain and mind over the course of 8 weeks. This year and in the past we’ve met with a variety of neuroscientists and psychologists at places like Harvard’s MRI Research Lab at McLean Hospital, the Harvard Brain Bank, Josh Greene’s Moral Cognition Lab and the psychology department at the University of Massachusetts.

Students dissected the brain of a fetal pig and cat in science and dissected the concept of mind and spirit in humanities. Amir experimented with incorporating mindfulness into many aspects of his curriculum. We hopefully inspired our students to shine a light on the mysterious universe of the human brain and ask themselves important questions. The final assessment required each participant to contribute an original article and piece of artwork for our Science of the Mind Journal. Students researched and wrote about topics of their choice ranging from ADHD, addiction, and schizophrenia, to brain cancer, religion, and neurobiology, which were printed in our class magazine.

If this class has helped Kyle understand his learning style and inspired him to delve into a subject he was curious about, then we have succeeded. I wish that educators everywhere could have this type of opportunity—to experiment with how to help students find meaning in their education and lives—to experiment with designing truly unique classes that merge the experiences of experts and students—to study the intricacies of brain, mind, and body.
After reading and analyzing Plato’s *Parabale of the Cave* and watching the film, *The Matrix*, students were asked to make artwork inspired by the parable and/or the film.
LEN A GLICKMAN’S *Parable of the Cave* image: “Reality is Silent”
ABOVE: Aliana Bloch’s *Parable of the Cave* image: An illustration limited perception of reality.

BELOW: Ariel Temple’s *Parable of the Cave* image: A depiction of a child who grew up never seeing any TV program other than *Fox News* and thus has a skewed vision of the world.
BELOW: Kyle Takei’s *Parable of the Cave* image.
LEARNING STANLEY
understanding autism
BY CAITLIN GREVE

When I meet someone new, I’m shy. Because of instinctive fear, my nerves coil into serpents to protect what may be harmful. I assumed Stanley would be the same. He wasn’t. With his faded hulk pajama pants and dinosaur shirt, Stanley hovered over his feet and took me by the hand. As I stepped over the threshold of Stanley’s safe haven, I knew that we’d be buddies. “Hello girl. Do you want to see my room?” he asked with unconfident forwardness. “I call it my magnificent menu of prehistoric posters. That’s because I have pinned to my wall approximately ninety nine square feet of solidified plant material pigmented with dye, which is mixed with acetic acid to best absorb the paper fibers, strategically bound together to produce images of prehistoric species.”

“I would love to,” I said, “and just so you know my name is Caitlin.” I followed Stanley’s lead.

As someone with faint dreams of “helping children with autism,” taking care of Stanley, a kindergartner with Asperger’s Syndrome, felt partially surreal to me. I initially set out for a summer job with the intention of earning some dough as top priority. I’d be damned if I was unable to fulfill my longing to return to Ecuador during my senior year. Going to Ecuador with my junior class was literally the most enriching, healing, and spiritual experience I’ve ever had. But, I knew I’d have to work exceptionally hard for it to happen again, and nonetheless solo. So, I first called a few local farms; hoping to mimic the mountainous regions of Ecuadorian life in Vermont this summer, but received no response. At this point, I was neither discouraged nor enthusiastic – neither stuck nor liberated with glee. Then, my mom came to the rescue (once again.) My mom always says, “Things happen for a reason.” I believe it – but to be honest, it sounds a little corny. Yet, here I was criticizing mi madre’s wisdom as she delivered Stanley’s Care Aid position to my fingertips.

After meeting Stanley and his parents, it hit me— as one of Stanley’s caretakers, I would need to not only prepare myself emotionally, but also, I’d need to learn about autism. Characteristics that fall within the Autism Spectrum vary from individual to individual. Asperger’s Syndrome has been well defined within that spectrum. Since Asperger’s does fall on the Autism Spectrum, the conditions are often used interchangeably in conversation, which can things very confusing. There is one thing I need to establish before proceeding; I do not want to sound hypocritical, which, at this point I can’t exactly avoid. Nonetheless, I can’t stand it when a label such as “popular, intellectual, freckled – faced” becomes the focal point of a third party’s understanding of someone. To aid myself in maintaining a semi-convoluted sense of dignity, whoever reads this article needs to know that I’m only focusing on Asperger’s because ignorance isn’t bliss in this situation. In other words, Asperger’s is only one of an individual’s many traits. I’m exploring this facet of Stanley’s character to gain a better understanding of this trait’s so called truth. And I don’t consider Aspergers a “disorder,” but another way of relating to the world as it is.
"You're wearing a dress today because you're a girl. I'm wearing a tee shirt and sweatpants because I'm a boy." Stanley spoke to me through the wind, which carried his words to my ears. His literal language just makes sense to me, whereas, "Dresses suit your fancy," is purple prose. As we walked to the back yard where a plastic blue swing was hung from an aging tree, Stanley recited for the first of many times to come, "If you don't upset the bees, the bees won't bother you."

"Yes, that is true," I said.


"Mmm," I mumbled, "I also fear spiders." I wasn't yet sure whether or not to elaborate on the "why" per se, because I wanted to leave enough space for Stanley to express himself, and to be honest. I just like listening to what he has to say because he's very inquisitive. But, I also wondered how much I needed to respond in order to give Stanley a sense that I was acknowledging him, because socialization is critical for people with Asperger's. This was an area in need of further investigation.

What I came to find is that the solution is very simple; respond if I naturally feel the need, but make sure my response is lacking any idioms, metaphors, etc., because this "beating around the bush" literally don't make sense. Who beats around a bush and why are they doing that?

"Find the fish" Stanley directed me to use a flashlight to better my luck while scavenging in his toy bucket, and laid an open sea creature encyclopedia on my lap. As I hovered over the array of modernized toys, my hand stumbled upon an unfortunate stimulus: an ugly, florescent blue stuffed shark that shakes and laughs relentlessly in varying tones and volumes when touched.

Where was the power switch? Why was this even in Stanley's room? Shouldn't there be a rule against toys like this? Stanley's eyes froze open as he robotically stood up to turn off the light; his ears were quickly enveloped by a blanket after diving into his bed, and his mouth became plugged with a pacifier.

Stanley's auditory sense had been bombarded. And I had found the wrong fish. To someone like Stanley, with hyper-acute hearing, sounds can be painful. The pitch, direction, intensity, etc. can't be filtered and manageable processed, resulting in a dreadful flood of confusion. Every "little" noise is in itself a whole entity to capture. The dog down the street yelps like a scream to the ear, the babbling radio can be likened to a surround sound audio system in a movie theater, and the man eating an apple crunches like Godzilla.

The other senses are just as powerful. Glaring lights and invasive colors nauseate the visual sense. The
cafeteria is making fish for lunch, which violates the olfactory system, and the tag on a tee-shirt induces prickling willies to run along the backbone.

While the tactile sense is hypersensitive and the child may be unable to regulate sensations, at the same time, there may be a lack of awareness of others, leading to boundary crossing physical contact. For example, when I was spending my first hour ever with Stanley, he climbed onto my lap and drew me a map. He noticed my hair was dyed red as he stroked his fingers through each strand to feel its texture. He noted that my face was soft, while being percussively reminded by his mom that other people’s bodies belong to them and that they don’t always want to be touched.

Stanley’s mom began to tell me a story about an interaction she witnessed him having at school. He had asked a little girl, “Why are you shying away from me?” as he squinted in her direction with curiosity after he had approached her with a gentle brush of the arm. “I just don’t like to be touched,” the girl had pleaded.

She talked into her shoulder with robotic intonation. “Oh. Well, I won’t touch you. But, I won’t hurt you,” Stanley explained.

“I have to go to the bathroom,” Stanley interrupted the story with his most recent tick—excessive trips to the bathroom. Ticks are a form of obsessive behavior typical in people with autism. Expressing in words how a family member’s illness was impacting him was impossible for Stanley, so communicating through the tick was his coping mechanism. For someone with Asperger’s, behaviors speak when words cannot.

“Did you bring your dog?” Stanley once asked if I had a dog, and asked me to bring her for a visit the next time we saw each other. I told him that my dog is very big and that I would need to bring a picture of her instead. I’m going to fetch a picture of my dog right now so that I don’t forget. As I look at the picture, I imagine what Stanley would say, “Golden retrievers are the loyalist of all canines.”
On a dreary mid March day, both my students and I are languishing after lunch, our bellies heavy with pasta and marinara sauce, and our nerves a little jittery. We are all thoroughly sick of the many PowerPoint anchored discussions that have dominated the class thus far, and over which I'd spent hours laboring. Our collective fatigue is odd in a sense, because with these Power Points, I think I actually achieved my goal of creating a forum in which students experience their minds, as opposed to all of us talking about, and ultimately, around the concept of mind.

For instance, to get the point across that visual perceptions are highly primed by what we have already seen, I projected some images of a hallway of a high school that several students in the class had previously attended and not enjoyed. I told the class to record in writing what they observed. I didn’t tell them where the images were from. Upon taking in the visuals, one student, who had attended the high school, did a double take and her jaw dropped like a stunned cartoon character. Still a little dazed, she shared that while looking at the picture she perceived a nearby wall covered in artwork that she hated. She also imagined that the banana bread she had left in her locker a year earlier was still there. Another student, who had not attended that school, said that she just saw a bland interior, and then chuckled as she mused about how cool it was that the two perceptions were so different. The students’ experiences unfolded exactly as I had envisioned. I was delighted; all was good.

And yet, all was not good. Though this lecture and others had gone well, something wasn’t quite right. I wasn’t surprised when one student wrote in the course evaluation, “Even when the PowerPoint presentations were interesting, sometimes the idea of watching a whole PowerPoint made me dread class. I got tired of looking up at that screen.” Another student declared flatly, “All in all, I found the class to be a little boring. We spent a lot of time in lectures… if these lectures had been a little faster, they might have been more interesting.”

So on this dreary March day, having a sense of the students’ sentiments before I received them in writing, I tried to let go of my agenda of getting a point across via technology-aided presentation. We had transitioned from exploring visual perception to the even juicer topic of emotion. Everybody feels something at any given moment, so I figured: why not just ask the students to turn inward and try to explain what they were feeling right at that instant?

I gave the instructions, but nobody said anything. I paused. Ten seconds of complete silence elapsed, but still nobody said a word. I waited some more, hoping blindly that the silence might create a container of safety and awareness. Eventually, somebody, I don’t remember who, raised a tentative but courageous hand, and ventured, “Worthless.” Nobody reacted with any outward sign of derision or approval. I wrote the word on the board and said nothing. The ice had been broken.
Somebody else moaned, “Sick?” I didn’t bother to ask if she meant in the physical or emotional sense; instead, I just wrote the word on the board, and looked pensively at the eight teenagers sprawled before me in various positions of repose. And then, words came pouring out of all the students in spontaneous popcorn succession: stressed, apathetic, distant, anxious, hyper, jittery, exasperated, restless, alienated.

In chalky chicken scratch, I scrawled each word of this inventory of torment as fast as I could, and added an emotion or two of my own. We paused to look at our collective state for a moment. It was, needless to say, kind of pathetic.

Paradoxically, as all of these words associated with suffering surged forth, a tangible sense of ease and unity seemed to settle throughout the room; as we gave voice to our feelings in discrete bursts of single words, our emotions changed. Somebody offered, “Calm,” and we all chortled almost inaudibly at the incongruity of the word set starkly against the backdrop of the litany of woe that came before it. This was followed by another round of giddy melancholic release: upset, empty, disappointed, emotionless, sad, drained, and the emphatically plain, bad.

Later, when I asked a student about her experience of that day, she said, “It was like talking to people when I’ve been sad for a while, and they’re acknowledging how I feel, even though I’m not sad at that time. It was nice to all share those feelings together, but at the same time, it kind of captured the low energy of the class.”

Reflecting on this course, I have been reminded of two lessons that I keep forgetting. First, sometimes it’s possible to over plan, and to be a little too clever for everyone’s good. Planning, of course, is necessary, but if education is to be truly experiential, the plan needs to allow for unforeseen ideas, stories, and emotions to arise and be heard. Second, even when students have a string of unsatisfying experiences in class, a great deal of important learning can still take place. The same student who declared the class to be boring also wrote, “My mind is a lot more open [after taking this class] and I have a different perspective with which to look at life. I’m very happy about that.”

At first, when I read these seemingly incongruent statements, I was perplexed. After sitting with it for a while, however, I was reminded of an insight that visits me often, but that I never remember for very long; while things in the classroom may look and feel messy, unruly and even boring at times, order and continuously entertained students are not necessarily indications of an environment that is fertile for growth and transformation.

Acting as a coach and editor for half the student writers represented in this journal, I can attest to the fact that creating this magazine was anything but orderly. While settling on topics, doing research, and drafting their articles, several students literally sobbed, they often procrastinated, and at many junctures, felt like giving up. And yet, in the end, each one, I believe, produced a personally meaningful, engaging, and informative article that skillfully explores the student’s chosen realm of mind and brain. I wonder if a process as rich as this can really unfold in any other way.
COMPASS SCHOOL provides a unique model for publicly accessible education, serving children in our region while making an impact on the larger educational world. We embody an inspiring learning community that balances personalized education with high expectations for all, leading each student to successful graduation and post-graduate experiences.
“It is impressive and inspiring to see high school students so deeply engaged with cutting-edge scientific questions.”

Joshua Greene, Psychology Professor Harvard University