MIT's Oldest and Largest Newspaper

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The Tech

Established 1881

WEATHER, p. 2

THU: 32°F | 22°F Mostly Cloudy

FRI: 36°F | 28°F Partly Sunny

SAT: 38°F | 29°F Chance Snow and Rain

Volume 139, Number 4

Thursday, February 28, 2019

ALEX LI—THE TECH

The first day of the College of Computing celebrations Feb. 26 includes interactive panels and demonstrations of MIT's recent advances in the field.

New CUP proposal affects Class of 2023 First-Yr. Experiment

Proposal keeps Class of 2022 P/NR grading policies, changes credit caps

By Billy Woltz
STAFF REPORTER

The Committee on the Undergraduate Program (CUP) presented a proposal for a "Phase Two" continuation of the First-Year Experiment at a faculty meeting last Wednesday afternoon. Phase Two would impact the Class of 2023.

The presentation was led by Professor Duane Boning, chair of the CUP.

The current "Phase One" policy for the Class of 2022 allows students to designate three additional science core GIRs to be graded as P/NR after the first semester. Phase Two retains the Phase One grading policy for fall 2019 and spring 2020 but changes the credit limits for both semesters.

Currently, in the fall semester, students can take no more than 54 units total, and there are no other Institute restrictions on students' course load. The modifications that the CUP proposes are twofold. First, the general credit limit would be reduced to 48 units. Second, there would be 9 additional "Discovery" units that students can only use to take freshman advising seminars, first-year discovery seminars, and UROPs for credit.

Then, in the spring of 2020, the credit limit would consist of a general credit limit of 54 units and an additional 9 Discovery units. In contrast, the current policy limits students to 57 units unless they have been offered Early Sophomore Standing (ESS).

In addition, the CUP proposed that ESS be replaced with an option available to all first-year students that they may, with advisor approval, take 60 general units of courses. The CUP believes that this additional course would be used as an elective or major course that would help students decided which major to pursue.

The CUP put forth many reasons to consider alternatives to ESS. At the faculty meeting, Boning highlighted two of these reasons. Currently, students are eligible for ESS if they have completed 96 units of credit before IAP of their freshman year and a communication-intensive course. Therefore, eligibility for ESS is in no direct way based on demonstrated academic success during the students' first semester at MIT. In fact, according to Boning, the top half of students not offered ESS this spring performed better than the bottom quartile of students who were offered ESS this semester.

Furthermore, Boning argued that students from high schools with large AP programs are the ones who are more likely to be eligible for ESS, while highly capable students from other schools are unlikely to be offered ESS.

In his presentation, Boning put forth a timeline that hopes to have further discussion of the Phase Two proposal in March and to be able to explain the experimental policy to prospective students and their parents by CPW.

The faculty responded with a few concerns and suggestions. One faculty member proposed that pressure could be relieved by having students declare their major at the end of their first semester of sophomore year. However, that faculty member also acknowledged that this has many implications for department requirements and advising.

Another faculty member was concerned that the flexibility in the Phase One grading policy allows students to delay taking biology and chemistry GIRs, reducing the

Phase Two, Page 2

Protestors gather against invitation of Indian politician Subramanian Swamy at MIT India Conference Feb. 16

Protestors gathered outside the Media Lab while Subramanian Swamy, a member of India's parliament and the Bharatiya Janata Party, spoke through video stream at the MIT India Conference Feb. 16. They demonstrated against MIT's inviting Swamy to speak given his previous Islamophobic and homophobic comments.

The protest was organized by the Aazaad Lab, Alliance for a Secular and Democratic South Asia, Indian American Muslim Council, Connecticut Tamils, and the MIT LGBTQ alliance. The over two dozen protestors held up posters with messages including "MIT Kick out Brahminical Fascists" and "MIT Welcomes Hate Speech." Some protestors were MIT students; some were Cambridge and New England residents.

Swamy called homosexuality a "genetic disorder" on the Indian news outlet ANI in July 2018.

Swamy proposed to "declare India a Hindu Rashtra [state] in which non-Hindus can vote only if they proudly acknowledge that their ancestors were Hindus" in an article in the Indian newspaper DNA in July 2011. His comments were received with criticism for being Islamophobic; as a result, Harvard dropped two courses taught by Swamy.

"Many people spoke and expressed their disappointment and anger with MIT for not rescinding the invite to Swamy," Arif Hussain, a resident of Cambridge and one of the protest organizers, wrote in an email to *The Tech*. Hussain also compared Swamy's invite to those of Saudi Crown Prince Mohammed bin Salman and former U.S. Secretary of State Henry Kissinger, and wrote that MIT was sliding towards a "more right-wing conservative position."

Hussain said in an interview with *The Tech* that he was not generally opposed to the invitation of other politicians from Swamy's right-wing political party to the conference.

In the days leading up to the conference, posters were put up on campus to promote disinviting Swamy. A petition on change.org urging President Rafael Reif to rescind Swamy's invitation gathered over 2,000 signatures.

However, the student organizers of the MIT India conference decided not to disinvite Swamy, and the MIT administration decided to support the student organizers. Chancellor Cynthia Barnhart '88 and Provost Martin Schmidt '88 wrote in a letter to the editor to *The Tech*, "We are and must be committed to ensuring that different points of view — even those we reject — can be heard and debated in a respectful and safe way."

—Rujul Gandhi

IN SHORT

Today is the last day of Celebrations for the **MIT Stephen A. Schwarzman College of Computing**. The schedule of events and other information is available at helloworld.mit.edu.

Sophomores, makeup **ring sales** end today 4 p.m. Information is available at brassrat2021.mit.edu.

Submit your applications to become a **first-year associate advisor** and/or an **orientation leader** by Friday.

The last day to **add a full-term subject** is March 8. Make sure to plan ahead and meet or contact your advisors ahead of time!

The deadline to **submit events for CPW** is Friday.

Interested in **joining *The Tech*?** Stop by for dinner Sunday at 6 p.m. or email join@tech.mit.edu.

Send news and tips to *news@tech.mit.edu*.

MAZHAR QURAISHI

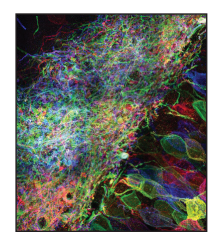
MIT students, Cambridge and New England residents, and other protestors gather outside the Media Lab in response to the MIT India Conference's invitation of politician Subramanian Swamy.

MIDLIFE CRISIS?

Auntie advises a young woman to think about her own thoughts.
CAMPUS LIFE, p. 3

THE NEW VASAAR NOT-SWING DORM

A tale of broken promises on a would-be cook-for-yourself community.
OPINION, p. 4



'WATCH, PERTURB, MAP'

The Boyden Lab develops interdisciplinary tools to understand the brain.
SCIENCE, p. 8

WHAT ETHICAL CHANGE REALLY COSTS

One billion dollars is not the solution to the ethical problems of the College of Computing.
OPINION, p. 5

SECTIONS

WEATHER

A cold start to March

By Sarah Weidman
STAFF METEOROLOGIST

As we enter March and start heading towards the spring season, don't expect too much warmth. The National Weather Service Climate Prediction Center is predicting a colder than normal month ahead, with the cold starting this weekend. After the snow last night, another low pressure system is expected to hit the northeast this weekend, potentially bringing in more snow and rain on Saturday night. For now, keep your snow boots around in case of future storms, as the sunny warmth of spring is not yet upon us.

Across the country, there has been a good amount of precipitation this winter, especially in the west. Northern California got a large amount of rain earlier in the week, causing flooding concerns throughout the area. The Rocky Mountains have had several large snow storms this winter, bringing an exciting ski season to the western states. After such a dry and forest fire filled summer last year, hopefully this precipitation will bring enough moisture and snowmelt to reduce the fire risk for the rest of the year.

Extended Forecast

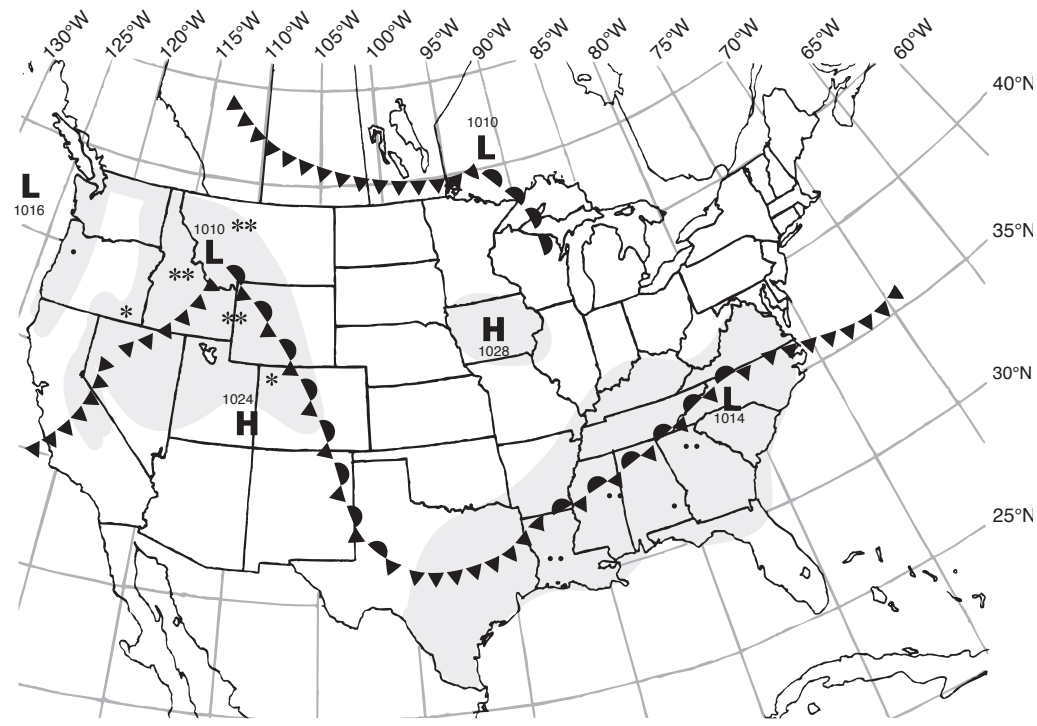
Today: Mostly cloudy. High around 30°F (-1°C). North winds at 5-10 mph.

Tonight: Mostly cloudy. Low around 22°F (-6°C). Northwest winds around 5 mph.

Tomorrow: Partly sunny. High around 36°F (2°C) and low around 28°F (-2°C). Northwest winds around 5-8 mph.

Saturday: Chance of snow and rain. High around 38°F (3°C) and low around 29°F (-2°C).

Sunday: Sunny, then chance of precipitation. High around 41°F (5°C).



Situation for Noon Eastern Time, Thursday, February 28, 2019

Weather Systems	Weather Fronts	Precipitation Symbols			Other Symbols
			Snow	Rain	
H High Pressure	Trough	Showers	* ▽	• ▽	Fog
L Low Pressure	Warm Front	Light	*	•	Thunderstorm
§ Hurricane	Cold Front	Moderate	**	••	Haze
	Stationary Front	Heavy	⁂	⁖	Compiled by MIT Meteorology Staff and *The Tech*

Faculty member expresses concern that students delay bio., chem. GIRs

Phase Two, from Page 1

ability to explore courses such as 5, 7, 10, and 20. Another felt that the timeline seemed somewhat rushed, and by following this timeline much of the opportunity for discourse would be lost.

As a whole, the First-Year Experiment is an effort spearheaded by the Office of the Vice Chancellor (OVC) and the CUP in response to the data that they have collected that indicates that many students do not feel prepared to select a major at the end of their freshman year. In his presentation to the faculty, Boning showed that in responses to the 2018 Perception of Academic Majors survey, only 33 percent of surveyed students strongly agree that they were well-prepared to declare a major.

The OVC and CUP have reason to believe that this is a result of a lack of ability to explore other majors by taking introductory classes in courses of interest. According to Boning's presentation, the CUP Study Group on Majors for students entering in fall 2017 found that many students feel pressure to take many science core GIRs on P/NR in their first semester, leaving little to no room to explore other classes. They developed the First-Year Experiment to explore alternatives that could alleviate this issue.

Solution to Daisy

from page 9

6	2	9	8	3	1	4	7	5
5	3	7	6	9	4	1	2	8
8	4	1	5	7	2	3	9	6
7	9	5	3	4	6	2	8	1
2	1	6	7	8	9	5	4	3
4	8	3	1	2	5	7	6	9
9	5	2	4	1	8	6	3	7
3	6	8	2	5	7	9	1	4
1	7	4	9	6	3	8	5	2

Solution to Chrysanth-

from page 9

4	3	2	6	1	5
3	2	1	5	6	4
2	1	6	4	5	3
6	5	4	2	3	1
1	6	5	3	4	2
5	4	3	1	2	6

ADVICE

'How do I stop myself from feeling like this?'

Auntie Matter on assertiveness and metacognition

By Auntie Matter

If you have questions for Auntie Matter, please submit them at tinyurl.com/AskAuntieMatter. Questions have been edited for length, clarity, and content.

Dear Auntie Matter,

I feel like I'm going through a midlife crisis. One of my closest friends (I thought) doesn't seem to want to talk to me anymore; she'll text me back when I text her, but she doesn't seem to care enough to actually talk to me on her own (and we live far enough away that we can't really visit). I know that how much she talks to me is her choice (and she might be busy) and she certainly doesn't owe me anything, but it sucks.

I used to be really good friends with one of my exes, but several months ago something happened — he ignored when I said I wasn't interested/didn't want to do something and ever since I've been on edge around him. He keeps trying to talk to me constantly and I feel guilty for not wanting to be around him, even though I know I have a right to.

Some of my other friends have been getting on my nerves lately and I can't tell if it's because I'm stressed, I'm letting the situation with those people bleed over into my other interactions, or if it's because I'm just a bad person. Some of the things my friends do and their senses of humor (I suppose) remind me of my ex and it's making me really uncomfortable, which is unfair to them. I know I shouldn't isolate myself and I'm not trying to, but my grades are slipping and I don't really trust or know most of the people around me to the point where I'm comfortable talking about this with them. I'm always stressed and I feel like I'm never going to accomplish anything. Sorry this is so long, but how do I stop myself from feeling like this?

— Struggling

Dear Struggling,

In the first two-thirds of your letter, you describe two different situations: the uncertainty around your long-distance friendship and the situation with your ex.

First, the only way you are going to find out what is going on with your long-distance friend is to call and ask her about your friendship. You should neither accuse her nor make excuses for her, but you should have a conversation with her.

Now, about your ex — of everything in your letter, Auntie is most troubled by the sentence, "He ignored when I said I wasn't interested/didn't want to do something and ever since I've been on edge around him."

What did he do, dear letter-writer?

If the "something" is sexual in nature, Auntie highly recommends you go to VPR to discuss it confidentially with their compassionate staff. They can help you process your feelings about it, and you don't have to formally report it (unless you would also like to do that, in which case you can visit Title IX, too).

You can either end the friendship definitively, blocking him in every aspect of your life, or you can express the depth of your hurt and give him the opportunity to make it better.

Regardless of what he did, it sounds like he hurt you quite a bit, and Auntie sees two paths forward: you can either end the friendship definitively, blocking him in every aspect of your life, or you can express the depth of your hurt and give him the opportunity to make it better. If you choose the second option, and he fails, you have to let him go.

In all of these situations, you fail to express your disappointment because you believe more disappointment will follow. The truth is that you don't know whether a situation will improve until you try to improve it. This applies to your friends. You should try talking with them to see if you can either have them make small changes to make you more comfortable, or to work through your discomfort and annoyance with them. This could even bring you closer to them in the end, and if not, maybe you were not compatible as friends to begin with.

As a final practical point, you should consider talking to some other older or more experienced person who could help you get perspective on your situation. Options include your parents; your advisor; counselors at MIT Mental Health or deans at S3; your dorm's heads of house, GRTs, or RLAD; a chaplain; or any professor, staff member, older friend, or alum — basically, anyone you feel like you could connect with and talk to.

In addition to practical advice, Auntie has some ideas about how you think about things. Your letter reveals a lot about your character. Auntie commends you for trying to take such a measured perspective on what seem to be distressing circumstances. You seem like a strong, thoughtful person, and you should remember that the state you are currently in is temporary, and that you either have or can develop skills to better your situation.

At the same time, you are not achieving the measured perspective you are trying for. In your letter, you display cognitive distortions. Auntie is no psychologist, but even the layperson can learn to understand and identify cognitive distortions in their thinking. When you say, "I'm always stressed," or "I don't trust the people around me," Auntie wonders if you are catastrophizing. When you say, "I'm a bad person," Auntie thinks you might be labelling. This is not to say you are "crazy," or *trying* to misrepresent things. By all appearances in your letter, you are doing your level best to see things objectively. But these distorted thoughts and cognitive frames can be insidious — that is why it is important to identify them, so you can talk back to them. You are trying so hard to be objective, and recognizing cognitive distortions can be another tool that you use in that fight.

Auntie commends you for trying to take such a measured perspective on what seem to be distressing circumstances.

Auntie encourages you to do an experiment. Particularly with your friend group, where you (insightfully) identify that you might be experiencing some emotional "bleed," you may be experiencing some cognitive distortions. Write down your feelings about your friend group at a time when your mood is poor. Then, at a different time, when you are well-rested, well-fed, and not stressed, write down your feelings again. If you find that the reasoning is different, you can probably identify some distortions in the first account you write. Furthermore, when reflecting on your friendships in a better mood, you might be able to better discern which are the most worth keeping.

Sometimes in relationships it's best not to think in terms of rights or fairness, but in terms of what is good for, and acceptable to, both parties in the relationship.

Finally, Auntie would like to note another cognitive habit that might not be serving you. In your letter, you often seem concerned about what is "fair," and what people's "rights" are. While it is good that you try to be reasonable in your expectations for others, sometimes in relationships it's best not to think in terms or rights or fairness, but in terms of what is good for, and acceptable to, both parties in the relationship. What works for you might not be fair, but it might make everyone happy. Furthermore, framing things in terms of fairness and rights makes your relationships almost litigious, instead of collaborative. If you need to defend what is good for you in a friendship on the basis of a right, instead of on the basis of it being good for you, chances are either you or your friend are not really looking to the good of the other person, in which case you may not have a real friendship.

Auntie thinks you will look back on this period in your life as one in which you learned a lot. Good luck, and feel free to write back!

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GUEST COLUMN

A history of broken promises in the New Vassar dorm design

Months of student-administration collaboration discarded without proper explanation

By Lilly Chin

On Feb. 13, the Division of Student Life announced that Burton Conner would close for renovations. I was unsurprised to see BC finally get its deferred maintenance, but the real kicker came from the FAQ.

New Vassar “will not serve as a ‘swing’ dorm in the short or long term,” the FAQ stated. “New Vassar is a dining dorm, and residents will be required to purchase a meal plan.”

These banal statements are actually a fiery rejection of student input into New Vassar’s design. Throughout the design process, students have tried to make New Vassar an accommodating temporary home for cook-for-yourself communities. However, this FAQ shows that work has been destroyed by top-down administrative backtracking.

This is an especially bitter pill for me, since I was an active part of these conversations. In Fall 2016, I served on the Architectural Principles Committee, a DSL-organized committee to write what was nominally a set of guiding principles for future dorms.

The mailing list *dorm-of-the-future@mit.edu* served as the main student record of both this committee and the New Residences Working Group, a committee charged with determining New Vassar’s architectural specifics. I have uploaded all emails sent to this list to https://tinyurl.com/DotF-archive to cite them by date throughout this piece.

As MIT’s Capital Projects page reports, New Vassar was intended to provide MIT with “flexibility and capacity as it continues with its comprehensive renewal of campus housing.” Indeed, both students and administrators initially envisioned New Vassar as a swing space suitable for all MIT living groups, even potentially accommodating FSILGs in a controversial “Greek Village” style (Sept. 30, 2016). As late as October 2017, the then-president of DormCon wrote that New Vassar “will be a swing dorm for at least three cook-for-yourself dorms.”

With many of MIT’s dormitories overdue for renovation, a new dorm would need to be capable of hosting diverse dorm cultures — whether it be dining vs. cook-for-yourself or suites vs. wing organization. Students were eager to work with administrators to create a dorm that would support all of these communities.

However, it soon became clear that student well-being directly conflicted with actual administrative intent. The DSL backpedaled furiously on mutually agreed upon principles jointly laid out in committee and unilaterally made decisions without student consent.

Originally, both students and administrators agreed that the dorm should have between 35 and 50 percent singles — a compromise balancing student preferences for singles while maximizing the number of beds (Sept. 30, 2016). However, after committee meetings had stopped, the final Architectural Principles document claimed that 30 to 40 percent singles was the optimal ratio (Oct. 18, 2016). In the final design, only 25 percent of the rooms in New Vassar are singles (Oct. 17, 2017).

This pales in comparison to the war of attrition on dining. From the beginning, student leaders fought hard for sufficient culinary support in the Architectural Principles document. Despite initial administrative assumptions that all new dorms would be dining dorms, students pushed back to ensure that non-dining options would still be considered and that dining dorms would still provide a full kitchen for every 50 residents (Sept. 30, 2016).

Despite the fight to have dining be a point of mutual discussion, the DSL unilaterally declared New Vassar would be a dining dorm. It is unclear how the DSL came to this decision, other than an appeal to “the data” (March 20, 2017).

Although they were disappointed that the DSL reneged on the Architectural Principles, students tried to make the best of the situation. Over the summer of 2017, the New Residences Working Group held intensive design discussions on how New Vassar could be a comfortable place for non-dining students to live, despite the presence of a dining hall.

Through the *dorm-of-the-future* mailing list, over 250 students were surveyed and gave constructive ideas on how to support cook-for-yourself communities. Current kitchen layouts were compared, with BC residents emphasizing the importance of suite-style kitchens (March 29, 2017). Students also proposed innovative solutions, like having centralized cooking pods rather than a single centralized dining hall (April 12, 2017).

All of this cross-campus student effort was ultimately ignored. The final New Vassar design has microwave-only kitchenettes and a centralized kitchen that is smaller than other dorms’ country kitchens, a significant reduction from the DSL’s purported architectural principles (Oct. 13, 2017).

These kitchen concessions, albeit limited in scope, offered some hope that non-dining communities would be able to survive in New Vassar. However, the DSL’s terse refusal to let BC swing into New Vassar has dashed those hopes. The fact that administrators have discarded a year’s worth of collaboration casts considerable doubt on other “innovation” efforts such as the upcoming mutual selection workshop. Why should students expend their labor during a busy school year when it will be ignored a few months later?

New Vassar tells a sad tale of how the DSL has repeatedly violated their own stated principles without working with students to find an acceptable compromise. By making New Vassar a dining dorm and emphatically not a swing space, MIT has ignored the voices and intentions of multiple generations of student leadership. It is furthermore inexcusable that they use this decision as justification for breaking up BC, as if their hands were tied. The administration tied their own hands, over students’ repeated and loud objections.

Lilly Chin is a PhD student in Electrical Engineering and Computer Science and a member of the undergraduate Class of 2017. She served as the UA Committee Chair on Student-Administration Collaboration from 2015–2017.

LETTER TO THE EDITOR

How will the College of Computing teach ethics if its dean is on Amazon’s board?

Dear editors,

MIT has announced that teaching ethics will be a focus of the College of Computing. This raises the question of what ethical principles it will teach to students.

Given that the college is named after the chairman of Blackstone, we must worry that “don't increase concentration of wealth,” “don't accelerate global heating,” and “don't support murderous autocrats” may be lacking among the principles to be taught. What more can we conclude from known facts?

Newly appointed Dean Huttenlocher is reportedly on the board of Amazon. We can surmise that he has no ethical qualms about Amazon's salient computing practices, starting with making software non-libre — controlled by Amazon, not by its users. This leads, in Amazon's case, to the usual secondary wrongs such as making softwarespy on the user for Amazon; designing software to block uses that many users will want; building in back doors, such as the one that Amazon used to remotely erase thousands of copies of the book, 1984, by George Orwell; and forcibly installing new versions of software, a practice known as “auto-update” or “sabotage,” depending on your point of view.

We can also surmise that he does not object strongly to Amazon's other business practices, such as taking control over retail markets, so that companies it doesn't recommend are greatly handicapped; dodging taxes; playing one city against another to obtain huge subsidies (i.e. welfare for the rich) and claiming this is doing them a favor; paying workers too little to live on; and working them so hard they get sick.

This conclusion is a surmise, not a certainty. We can hope Dean Huttenlocher will tell us that he disapproves of at least some of these practices.

The main question is, will the College of Computing teach students to see possible injustice in these practices, or will it legitimize them by focusing on more obscure ethical issues that don't come near “accepted” computing practice?

Richard Stallman is a visiting scientist at MIT. Stallman is also a leader of the free software movement.

OPINION POLICY

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Dissents are the signed opinions of editorial board members choosing to publish their disagreement with the editorial.

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GUEST COLUMN

Ethical change requires more than a billion dollars

It needs deep reflection and Institute-wide transformation

By Mark Goldman

In announcing the College of Computing (CoC), President Reif charged us with a bold mandate to reshape the Institute to deal with the challenges of the day, with two out of the five tasks dealing with ethical usage of technology, both in education and in research. With this bold ethical mandate, and all the similar ones to follow, I find hope in a better MIT. We might one day consider nefarious impacts of research before we start on a project. We might be willing to reject research funding that compromises our values. Our future students might leave MIT with a deep concern for the impact their work makes on the world. And I might be proud to belong to such an upstanding university.

At the same time, I remain skeptical. The announcement and direction of the college appears very top-down in its approach, and I fear that lack of buy-in from faculty, staff, and students will prevent the CoC from creating the transformative change necessary to fully embrace the ethical challenges mandated by President Reif.

Now that the CoC celebrations are wrapping up, we should recognize that convincing MIT faculty, staff, and students to value acting ethically will require much more than a few new professors and a billion dollars. We need to take a long, vulnerable look at ourselves and reassess our priorities. We likely need to set aside other core values, like faculty autonomy and maximizing endowment growth, so that MIT can better serve its mission. This will be difficult, but it is necessary to truly reshape MIT.

During my past four years at the Institute, I have experienced pervasive ethical avoidance and failures, which highlight how multifaceted and daunting President Reif's mandate is. A year after arriving on campus, I saw how the administration turned a student movement for MIT to reject companies that fuel climate science denial groups into Low Carbon Research Centers, which accepted money from at least one company that at the time belonged to a lobbying group involved in climate science denial, growing MIT's research budget at the potential expense of perpetuating falsehoods. With regards to faculty, I remember arriving to class with "Black Lives Matter" written across the top of the chalkboard and wondering whether the professor would at least acknowledge the words staring at all of us. He never did. And I remember the numerous times classmates proclaimed that they didn't care about what they worked on, or the impact it had, as long as it was challenging. This mentality mirrors the ethos of hackathons, which often condenses complex societal issues into small tech-based problems alleviating us of the trouble of asking larger, and often ethical, questions. For example, in a 2015 Clean Earth Hackathon I attended, we were asked to develop a technology that better sorts plastic fragments out of broken glass for a recycling sorting facility, ignoring larger questions like why we purchase and discard so much plastic and glass.

We can prevent these types of mistakes in the future by thinking about how ethics applies to our work. The administration can reassess when MIT should not accept funds which would contribute to misinformation and perpetuate inequalities within society. Some of these changes may infringe upon other Institute values, which can create political roadblocks, and the administration needs to be ready and willing to address the concerns created by these shifting values. For example, creating an ethical review board which evaluates broader impacts of corporate-funded research projects might go against the longstanding value of faculty autonomy by restricting faculty members' ability to accept research money, so the administration would need to roll this out in a way that reduces its perceived impact on faculty autonomy. Thus, the administration should evaluate how to tackle these issues before informing the entire faculty. To ensure that changes to the required curriculum address Reif's ethics mandates, the administration will need to develop metrics that measure the necessary ethical changes and collect data before and after that curriculum change to determine if the change met the requirement.

Faculty need to tackle their own discomfort with ethical issues and bring their newfound ethical framework into the classrooms and research labs. When motivating students with a real world example, they should resist painting the story as entirely good and without any ethical questions. They should integrate ethical questions into assignments when using realistic problem statements and projects. When accepting corporate research grants, faculty should make sure their research does not become public relations material for companies, especially if the research could be misused to prevent certain benefits to society, like fixing the healthcare system or tackling climate change.

As students, we must grapple with the knowledge that our work has the potential to harm society, and that we are responsible for the impacts of technology that we help bring into this world. In our CI-Ms, at conferences, or in publications, we should mention any potential ethical concerns alongside any societal benefits, and when attending others' talks, we can ask questions if they forget to mention ethical concerns about their new technology.

None of this is easy or natural, and the parties over the last few days have likely done little to help us question our moral shortcomings, but this is precisely what we must do. If, as MIT's administrators, students, and faculty, we are not serious enough about ethics to consider it in line with our other priorities, the CoC could perpetuate, or even exacerbate, the use of technology and AI in unethical ways to manipulate politics, increase economic inequality, and amplify extremist views. If this is the case, then the ethical promises MIT has made with the CoC will become the fake news that our technology is so successful at spreading.

Mark Goldman is a graduate student in the MIT Department of Chemical Engineering.

ARTS

MOVIE REVIEW

How to Train Your Dragon 3 sets out for a dazzling, dragon-filled voyage

The Hidden World might be Hiccup's and Toothless's last stop, but Berk lives on forever in our hearts

★★★★☆

How to Train Your Dragon 3: The Hidden World

Directed by Dean DeBlois

Screenplay by Dean DeBlois

Starring Jay Baruchel, America Ferrera, Cate Blanchett, Gerard Butler

Rated PG, Now Playing

By Lior Hirschfeld and Nyssa Miller

In *The Hidden World*, Hiccup and Toothless, the lovable duo, return for the final installment of the *How to Train your Dragon* trilogy, which began a full nine years ago. It looks like time hasn't stopped for the citizens of Berk, and the story picks up one year after *How to Train Your Dragon 2,* as our two protagonists enter early adulthood. Love is in the air, but while romance has a pivotal role in advancing the plot, Hiccup and Toothless's ever-evolving friendship remains the soul of the story.

The narrative itself is relatively straightforward and unsurprising. Anyone who has seen the trailer can likely anticipate much of the story, but what the film lacks in plot it more than makes up for in color and animation. The spunky, playful design of dragon-filled Berk swallows the silver screen and simply dazzles the eyes, and the spectacularly imaginative dragon species are refreshing and fun. The promise of an amazing Hidden World is of course upheld; the dragon's realm is kaleidoscopic eye-candy — a fantastical Great Barrier Reef.

As the title suggests, the dragons, and Toothless specifically, receive a lot of screen time in this movie, and this shift in focus pays off big. *The Hidden World* is incredibly effective at communicating their varied emotions through body language, and Toothless's vibrant personality feels as real as any human characters'. He is the center of a number of the film's strongest scenes, which often contain no dialogue at all.

Several of these moments are remarkably poignant, and both younger and older dragon fans will appreciate the film's emotional core. A wide array of human and dragon emotions permeate the story, elevating the film from genre-typical action to bigger thoughts. The relationship between Hiccup and his father, in particular, will resonate with parents and children alike. Auditory and visual callbacks to earlier films will be sure to trigger deep-buried nostalgia, and you might incidentally find yourself catching "the feels."

While some might find the story wrapped up too neatly, it stands to be said that at least Dreamworks found a good place to end the *How To Train Your Dragon* series. *The Hidden World* had laughs, tears, gasps, and *awwws,* and is a must-see for long-time fans.

COURTESY OF DREAMWORKS ANIMATION

Hiccup pets Toothless the dragon in *How to Train Your Dragon: The Hidden World.*

THEATER REVIEW

The squashed cabbage leaf prevails

Shaw's play done right

NILE SCOTT STUDIOS

Vaishnavi Sharma and Eric Tucker play as Eliza Doolittle and Henry Higgins, respectively, in Bedlam's *Pygmalion* at Central Square Theater.

★★★★☆

Bedlam's *Pygmalion*

Written by George Bernard Shaw

Directed by Eric Tucker

Central Square Theater

Jan. 31–March 3

By Alexandra Sourakov

STAFF WRITER

My Fair Lady, a musical based on George Bernard Shaw's play, was one of the more well-worn VHS's at home. "Wouldn't It Be Loverly" and "I Could Have Danced All Night" became my sister's and my choicest a cappella set list for belting out when home alone. It was my introduction to linguistics and creative insults ("draggle-tailed guttersnipe" is my sister's affectionate pet name). Later in life, I read the original play *Pygmalion*, reveling in the wit and sparkle of Shaw's writing. As one would expect, the thematic undercurrents of the play flowed much stronger without interruption by catchy Broadway tunes.

Returning to Central Square Theater once more, Bedlam is putting on an incisive, witty performance of Shaw's most popular work. The story: professor of phonetics, Henry Higgins (Eric Tucker), and his friend, Colonel Pickering (James Patrick Nelson), take up the challenge of teaching a flower girl, Eliza Doolittle (Vaishnavi Sharma), to speak like a duchess. The production is true to the spirit of the play as Shaw intended it and its delivery is superb.

We first encounter our Galatea on the steps of Tottenham Court Road where she is hawking her wares amidst a throng of people. At the end of the first scene, all but the six Bedlam actors sit down amidst the audience. I applaud Bedlam's creative use of audience members to realize an effect that is otherwise inaccessible with their economical troupe. Another feat they pull off splendidly is having most of the actors play at least two different characters. This duality is leveraged to stage a priceless tea party that feels like a merry-go-round (despite the unusual linear seating arrangement) as actors lift and lower props, change their accents, and worsen their posture — reaching its apex when Lewis has an extended exchange with himself and ends it with a perfect awkward silence. In short, the staging and set design are first-rate.

Instead of the thick Cockney accent that the character of Eliza Doolittle would normally sport, this Eliza's utterances reveal an Indian provenance (Higgins later specifies Delhi). My first reaction to this tailoring was ambivalent, but there are two reasons which make this an inspired directorial choice. The first reason is that it creates an immediate tie between Eliza Doolittle and Colonel Pickering, who has spent a large amount of time in India. The second, and more significant, is that for an American audience, a Cockney accent does not have the same connotation of otherness that it would have had for Shaw's twentieth-century British audience. In fact, the American tendency to romanticize British accents indiscriminately would have the exact opposite effect to the one intended by the author, and the central theme of language as a symbol of socioeconomic divides would be significantly dampered.

Eliza Doolittle is a character that undergoes a rapid transformation over the course of the play. Sharma makes this transformation believable, but more than that, she radiates exuberance on stage and conveys emotions with such depth of feeling that one feels like a robot imposter watching her. When Higgins stuffs a piece of chocolate in her mouth to give her a taste of the good life, tears spring up in Sharma's eyes, and she is able to simultaneously convey her desire to hide her enjoyment from Higgins and the absolute bliss that a well-timed piece of chocolate can bring. Eliza, as a character, often conveys several strong facets at any given moment, coupling grit, elegance, wounded pride, perseverance, weariness, or wonder. Sharma embodies these naturally, as though she's living through the play. Her accents and their evolutions too are perfectly executed, and her outbursts, gesticulations, and delivery of Shaw's hilarious dialogue provoked rolling peals of laughter.

Actor and director Eric Tucker portrays a Higgins who thinks himself above everyone and everything. As he says himself, he "treats a duchess as he would a flower girl." Watching him, I learned how to eat an apple with supreme contempt (for you slow pupils out there, he does it twice). His haughtiness does not translate into composure — he is simultaneously petulant, impatient, and surprisingly sensitive. The script makes it clear that he is not emotionally mature enough to express what Eliza means to him or even to talk to her without insulting her. But pulling that off on stage without veering into accidental comedy or insincerity requires Tucker's true talent. Nelson, with his deep mellifluous voice and tall willowy figure, embodies the graciousness and geniality of a true gentleman in his role as Higgins's elegant foil, Colonel Pickering.

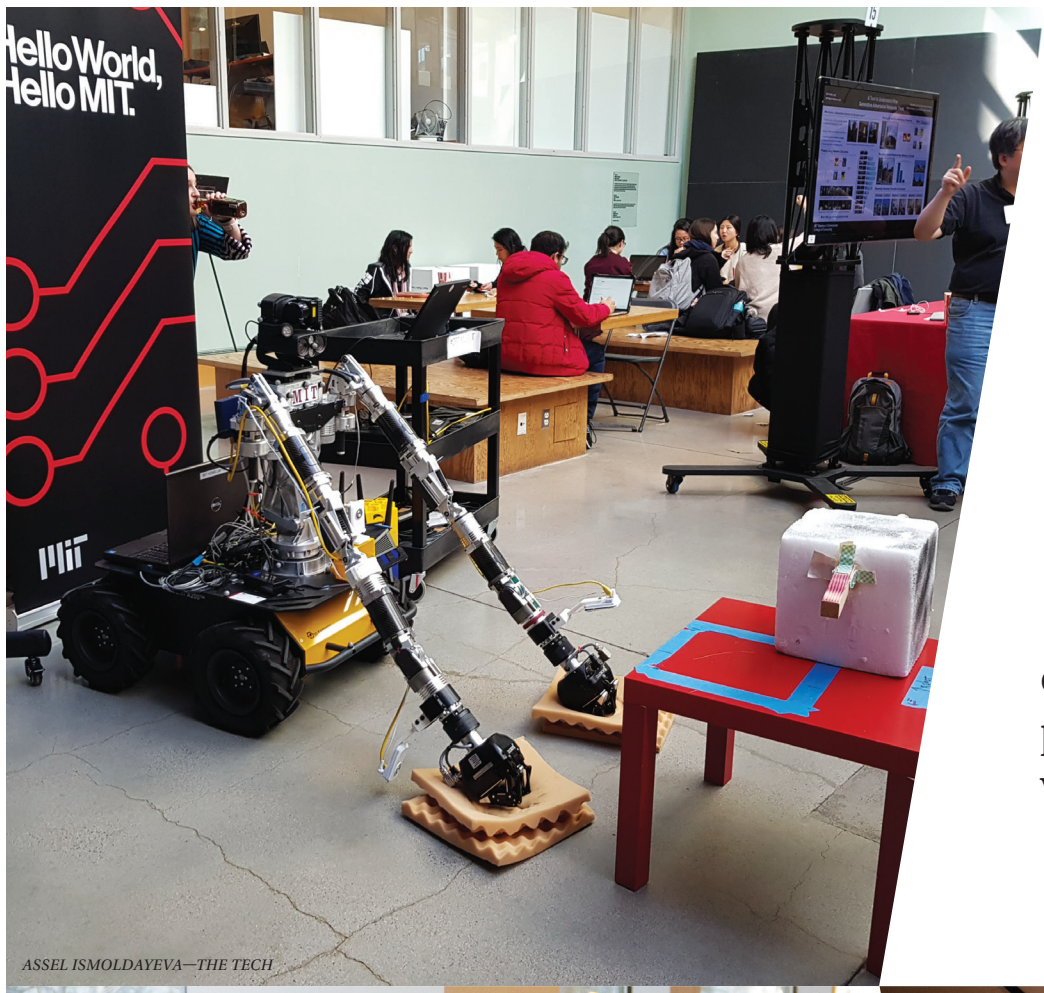
Edmund Lewis steals the show as both Higgins's mother and Freddy Eynsford-Hill, in a series of astonishingly nimble back-and-forths between the two characters. He comes across as a believably caring mother who rules with an iron fist — not just a stock upper-class matron. Mrs. Higgins is the only person Prof. Higgins will listen to, and, by his quipping remonstrances and withering looks, Lewis makes us see why.

Class divides and social mobility are themes at the heart of this play. One might think that Eliza's problems are solved now that she has learned to speak like a lady, but instead she finds herself trapped between two worlds, belonging to neither. Bedlam artfully develops this theme, not just through Shaw's words, but through small moments: to the same piano accompaniment, two scenes juxtapose the way Eliza and Higgins dress. Eliza lovingly, methodically drapes herself in a sari. Higgins irately, inattentively, throws his ironed white shirt on the chair and kicks off his shoes, inured to the luxury he was born into.

Bernard Shaw wrote a play in support of women's independence, but at every turn, actors, directors, and producers are trying to slap on a romantic, sentimental ending. Thankfully, Bedlam does not take this liberty. At the end of the play, Eliza is able to "retain her pride and triumph to the end," as Shaw once wrote in a letter. This production of *Pygmalion* will make you laugh and will make you think — I recommend it wholeheartedly. I look forward to seeing what Bedlam conjures up next when they return to Central Square Theater later this year with a production of Arthur Miller's *The Crucible*.

MIT Computing Expo

The first day of the College of Computing celebrations Feb. 26 included interactive panels and demonstrations of recent advances in the field.



ASSEL ISMOLDAYEVA—THE TECH

KEVIN LY—THE TECH

SHINJINI GHOSH—THE TECH

ALEX LV—THE TECH

ASSEL ISMOLDAYEVA—THE TECH

LAB SPOTLIGHT

‘Watch, perturb, and map’

A multifaceted approach to studying the human brain and condition

By Isabel Barnet

For Ed Boyden ’99, leader of the Synthetic Neurobiology Group, the ultimate puzzle can be summed up in one succinct phrase, he said in his interview with *The Tech*: “addressing the problems of the human condition through science.” It is only fitting that the lab’s work involves the creation and dissemination of the tools to study the fundamental mechanisms of brain function and applying these findings to treating disorders.

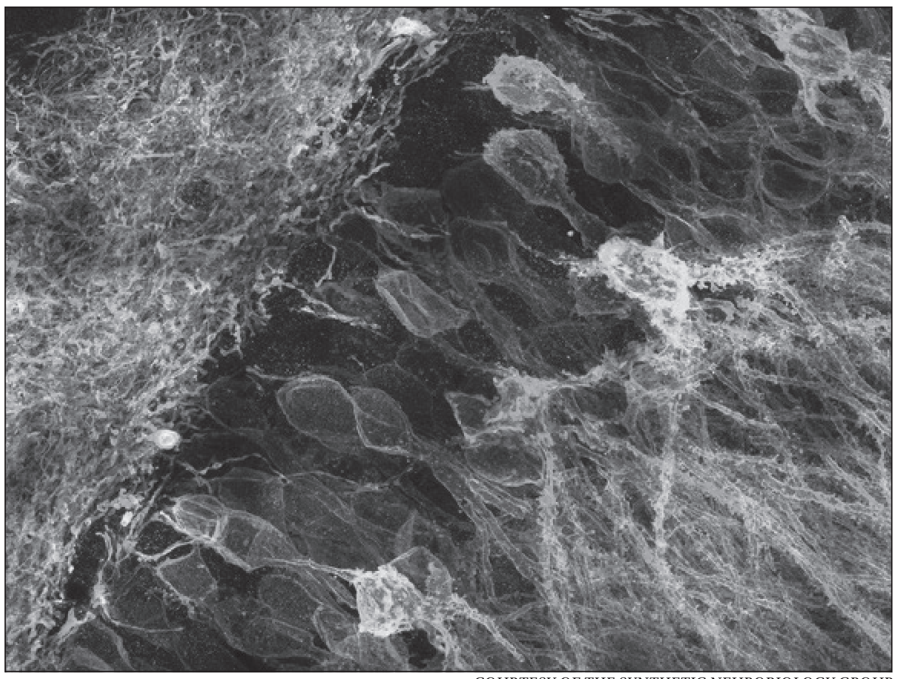
At a young age, Boyden became fascinated by the nature of suffering and happiness, and his perpetual curiosity drove him to becoming one of the world’s top biological innovators. However, the course that led him to the brain was rather nonlinear. Upon getting an early start to his college education, Boyden delved into a research project on the chemical origins of life and the derivation of DNA from inorganic precursors. He then transferred from his previous institution to MIT at age 16, initially applying his Course 6 and 8 education to a quantum computing project. Eventually, he landed on the brain, perhaps the most intricate yet revealing lens into the human psyche and behaviors. From then on, Boyden framed his outlook on the brain with engineering, philosophy, and science.

Boyden described his arrival to neuroscience as “great timing,” as his previous experiences in other fields equipped him with the unique ability to approach problems technologically. The evolution of his career is directly reflected in the lab’s work and makeup, which Boyden deemed “omnidisciplinary.” The Synthetic Neurobiology Group consists of 50 fulltime contributors, including a professional neurosurgeon, a former professional photographer with a background in art, biologists, chemists, physicists, electrical engineers, computer scientists, and more; this leads Boyden to conjecture that it may be one of the largest neuroscience groups in academia.

“Watch, perturb, and map” is the mantra of this avant-garde group of thinkers. In order to obtain the most comprehensive picture of the brain, the vast team of scientists is focusing on integrating three technologies: fluorescent voltage indicators to watch the brain, optogenetics to perturb the brain, and expansion microscopy to map the brain. Fluorescent voltage indicators, which the lab developed and announced last year, are molecules that glow when put into active brain cells. They are primarily used to image neural activity, or, in other words, watch the brain, by measuring membrane potentials.

Perturbation of the brain is achieved through optogenetics. Like fluorescent voltage indicators, optogenetic molecules are put into brain cells. But, mechanistically, they are more directly controllable. These molecules convert electricity to light, so when light is shined upon the brain, the brain cells containing these molecules are electrically activated. This command over the brain is key in understanding behaviors, as activating brain cells helps determine how they, as Boyden put it, “trigger behaviors or pathological states,” while deactivating them aids in establishing their uses and necessities. The implications of optogenetics are versatile, as the activation of a certain set of cells may have the capacity to, for example, trigger memories or combat disease progression. The technology has popularized immensely, and the Boyden lab has given it to thousands of research groups across the globe.

Finally, the brain is mapped through expansion microscopy. In 2015, the lab patented this technique, which allows for tissues to be imaged with nanoscale precision. Instead of relying on optical magnification, by which cost, imaging speed, and hardware complexity limitations arise, expansion microscopy involves physically and evenly magnifying specimen. This process is driven by the infusion of the tissue with what Boyden coined a “baby-diaper-like” chemical, which swells upon exposure to water and evenly expands the sample. The resulting tissue is essentially transparent, as it is primarily composed of water, and the expansion is so precise that, within the brain, for example, even the most minute of connections can be visualized. Since the magnification is physical, a variety of cheap, scalable, or high-throughput optical tools (such as lattice sheet microscopy or the aforementioned imaging techniques) can be paired with expansion microscopy, which, according to Boyden, has allowed the lab to image brain circuits “a thousand times faster than the competition, with this number growing soon.”



COURTESY OF THE SYNTHETIC NEUROBIOLOGY GROUP

An expanded piece of mouse brain shows the fine wiring of the brain. The neurons are expressing fluorescent proteins.

These three technologies have many applications to areas unrelated to the brain. For instance, two years ago, the lab published a paper on the implications of expansion microscopy on early cancer breast cancer detection. Typically, detecting cancer early is hindered by the small scale of the disease driven biological changes, but expansion microscopy can amplify these small, early changes into those that are visible. Since pathologists disagree roughly half of the time about the diagnosis of breast cancer biopsies, Boyden and his team devised a machine learning algorithm to classify expansion microscopy enlarged biopsies with a high degree of accuracy.

Though Ed Boyden’s work centers on the brain, the technologies his group pioneers are multidisciplinary at their core. Whether the lab is pursuing new diagnostic possibilities by applying their methods in a translational context, investigating the augmentation of brain function in the face of disability, or gaining a better understanding of our emotion, cognition, and motion as humans, it is clear that the trajectory of the work is forward, moving across boundaries and borders, imbued with an interminable zest to grasp the human condition and its infinite complexities.

Daisy

Solution, page 2

6		9		3				
			6		4	1		8
8		1		7				6
		5					8	1
			7		9			
4	8					7		
9				1		6		7
3		8	2		7			
				6		8		2

Instructions: Fill in the grid so that each column, row, and 3 by 3 grid contains exactly one of each of the digits 1 through 9.

Chrysanthemum

Solution, page 2

48×			180×		5
3		1			1–
12×		480×			
	5		6+		
5×	2–	1–		2–	
		3		12×	

Instructions: Fill in the grid so that each column and row contains exactly one of each of the numbers 1–6. Follow the mathematical operations for each box.

Dusty Devices by Brad Wilber

Solution, page 12

ACROSS

1 Numbers posted at racetracks
5 Swiss mountains
9 Without air, as a tire
13 Winfrey of TV
14 Have a good cry
15 Tardy
16 "Coming soon" ad, for short
17 Prefix meaning "against"
18 Woodwind instrument
19 Once-popular keyboard device
21 State west of NJ
22 Encountered
23 Cider fruits
25 Sculpted or molded
29 Bronze or brass
31 Desire granted by a genie
32 Mediocre
34 Narrowly defeated
38 Spanish goodbye
40 Country n. of Mexico
41 Woman's small crown
42 Intended
43 Fifth of a nickel
45 __ down (lose weight)
46 Courtroom pledges
48 Maintenance cost
50 Perform a lullaby for
53 Hour after noon
54 Aroma
55 Once-popular enclosure for making calls
62 Grandma
63 Shared by you and me
64 Thorny shrub
65 Breakfast restaurant chain
66 Run away from
67 Bowling pathways
68 Have a snack
69 Rapid
70 Large antlered animals

DOWN

1 Grand Ole __ (country-music venue)
2 Tiny bit of rain
3 Notre __ University
4 "I want to see that"
5 Be patient for
6 Period before Easter
7 Sampras of tennis
8 Twisting staircase shape
9 Once-popular data storage device
10 Tag inside a shirt
11 Make amends
12 Adolescents
13 Choose, with "for"
20 Crimson and scarlet
24 Person creating verses
25 Did laps in a pool
26 Conceal
27 Japan's continent
28 Once-popular record player
29 Donkeys
30 Cash advance
33 "That hurts!"
35 Heavy wind
36 One of the Great Lakes
37 A bit wet
39 Numerical datum
44 Adjust, as a piano
47 Fill fully, as a gas tank
49 Little stone
50 __-law (daughter's husband)
51 State known for potatoes
52 Forbidden things
53 Early stage
56 Luau dance
57 Metallic rocks
58 Word-of-mouth
59 Swine's sound
60 Golf pegs
61 Day fractions: Abbr.

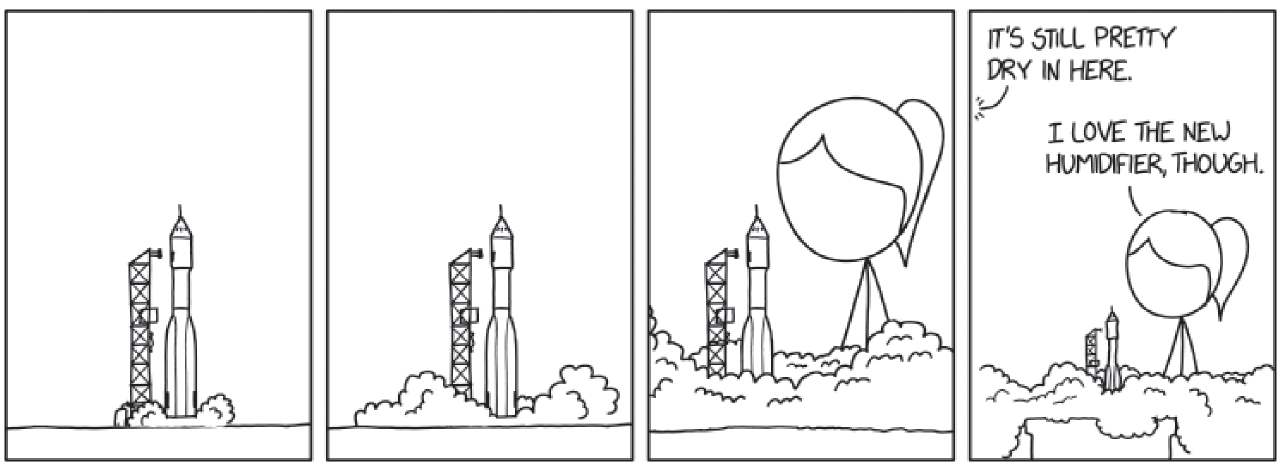
■	1	2	3	4	■	5	6	7	8	■	9	10	11	12
13					■	14				■	15			
16					■	17				■	18			
19					20					■	21			
■	■	■	■	22			■	■	23	24				
25	26	27	28			■	29	30				■	■	■
31				■	32	33			■	34		35	36	37
38				39	■	40			■	41				
42					■	43			44	■	45			
■	■	■	46		47			■	48	49				
50	51	52				■	■	53			■	■	■	■
54				■	55	56	57				58	59	60	61
62				■	63				■	64				
65				■	66				■	67				
68				■	69				■	70				■

xkcd

A webcomic of romance, sarcasm, math, and language

by Randall Munroe

[2114] Launch Conditions



Though I do think the tiny vent on one of the boosters labeled "O-RING" is in poor taste.

Rose

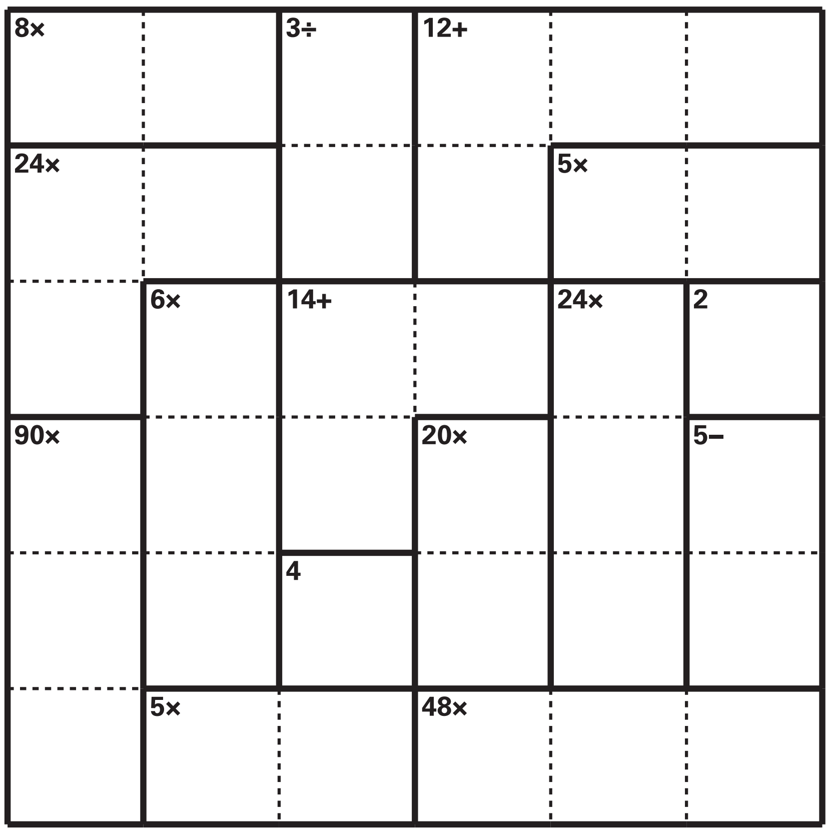
Solution, page 12

5		4			9			
				8	1			7
8				3			2	
2		3					7	
	5	6	1		2	3	9	
	9					6		2
	7			9				5
9			8	1				
			2			1		9

Instructions: Fill in the grid so that each column, row, and 3 by 3 grid contains exactly one of each of the digits 1 through 9.

Violet

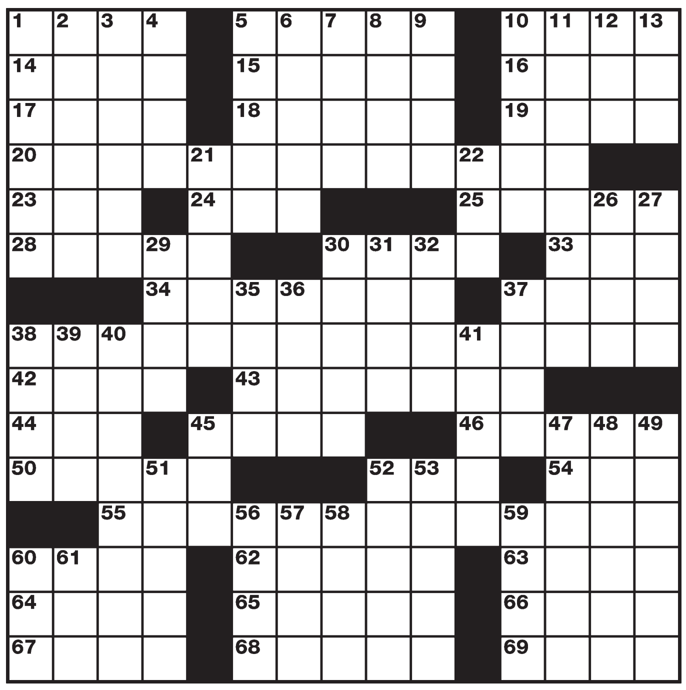
Solution, page 12



Instructions: Fill in the grid so that each column and row contains exactly one of each of the numbers 1–6. Follow the mathematical operations for each box.

At The Circus by Billie Truitt

Solution, page 12



ACROSS
1 Tip of a comet
5 Fashion rival of Gucci
10 Burger meat
14 Suffix for kitchen
15 Entices
16 Auto's wheel bar
17 Cape Canaveral org.
18 Assumed name
19 Green citrus fruit
20 Up-high circus performer
23 Warm embrace
24 Small cylindrical batteries
25 Ranted and __
28 Nose, informally
30 Hockey disk
33 "Now __ seen everything!"
34 True-to-life art style
37 India's continent
38 "Shot out" circus performer
42 Whitish gemstone
43 Immense
44 Took first place
45 Round Table titles
46 Congressional session broadcaster
50 Move furtively
52 "My lips __ sealed!"
54 Fuss
55 One-wheeled circus performer
60 Strauss of jeans
62 Moses' brother
63 Neither good nor bad
64 Matures
65 Foundation's donation
66 Sedan or coupe
67 Cause to yawn
68 Borders
69 Originate (from)

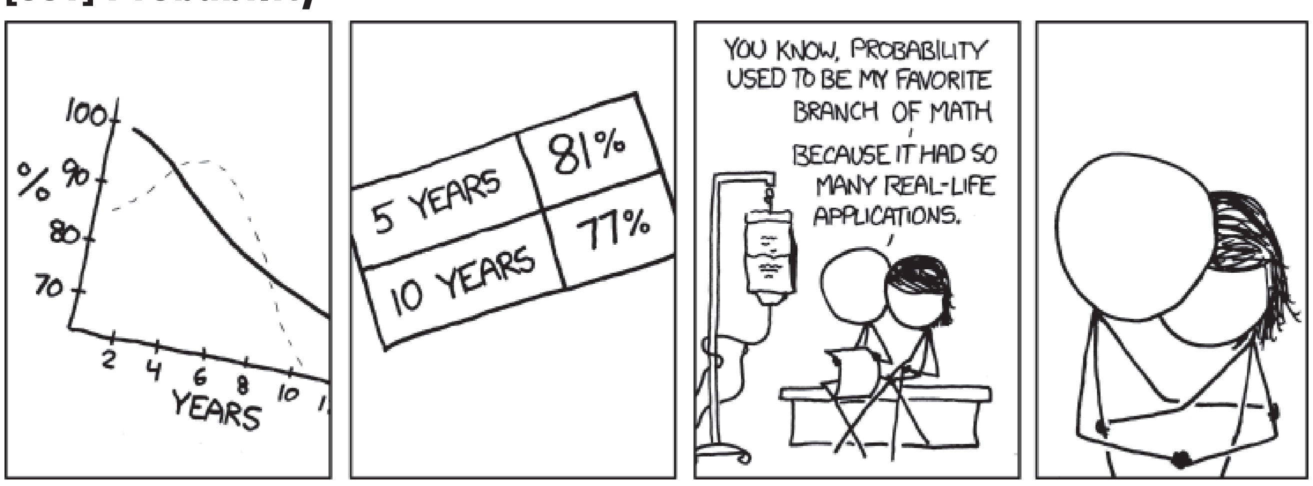
DOWN
1 Odometer's small increments
2 Galloping
3 "The project is on!"
4 Jump
5 City square
6 Regulations
7 Operatic solo
8 Hang on for __ life
9 Aide: Abbr.
10 Lightweight model wood
11 Permit to leave a country
12 Shade tree
13 Service charge
21 Gobbled up
22 Rub the wrong way
26 Wicked
27 Distribute the cards
29 By mouth, as a vaccine
30 Quart fractions
31 Annapolis sch.
32 "Let's go!"
35 First part of a play
36 Wild animal's home
37 Basics
38 "__ it going?"
39 Fairy tale's second word
40 Strategic tactic
41 More pleasant
45 Glide down snow
47 Make more lengthy than necessary
48 "__ Fideles" (Christmas song)
49 "Sorry, we're full"
51 Licorice-flavored herb
52 Without any help
53 Takes out a lease
56 Hamster's home
57 Three-foot measure
58 Rugged rock
59 "A miss __ good . . ."
60 Scientist's testing room
61 Swelled head

xkcd

A webcomic of romance, sarcasm, math, and language

by Randall Munroe

[881] Probability



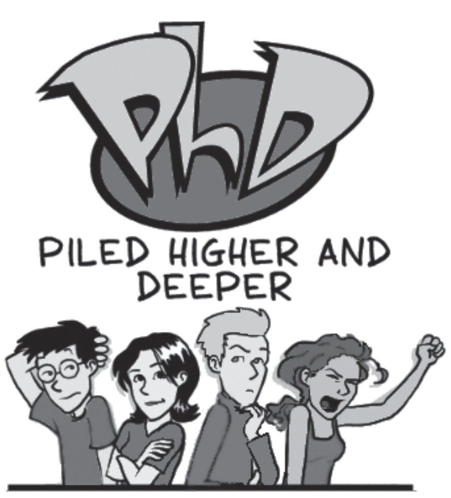
My normal approach is useless here, too.

Sunflower

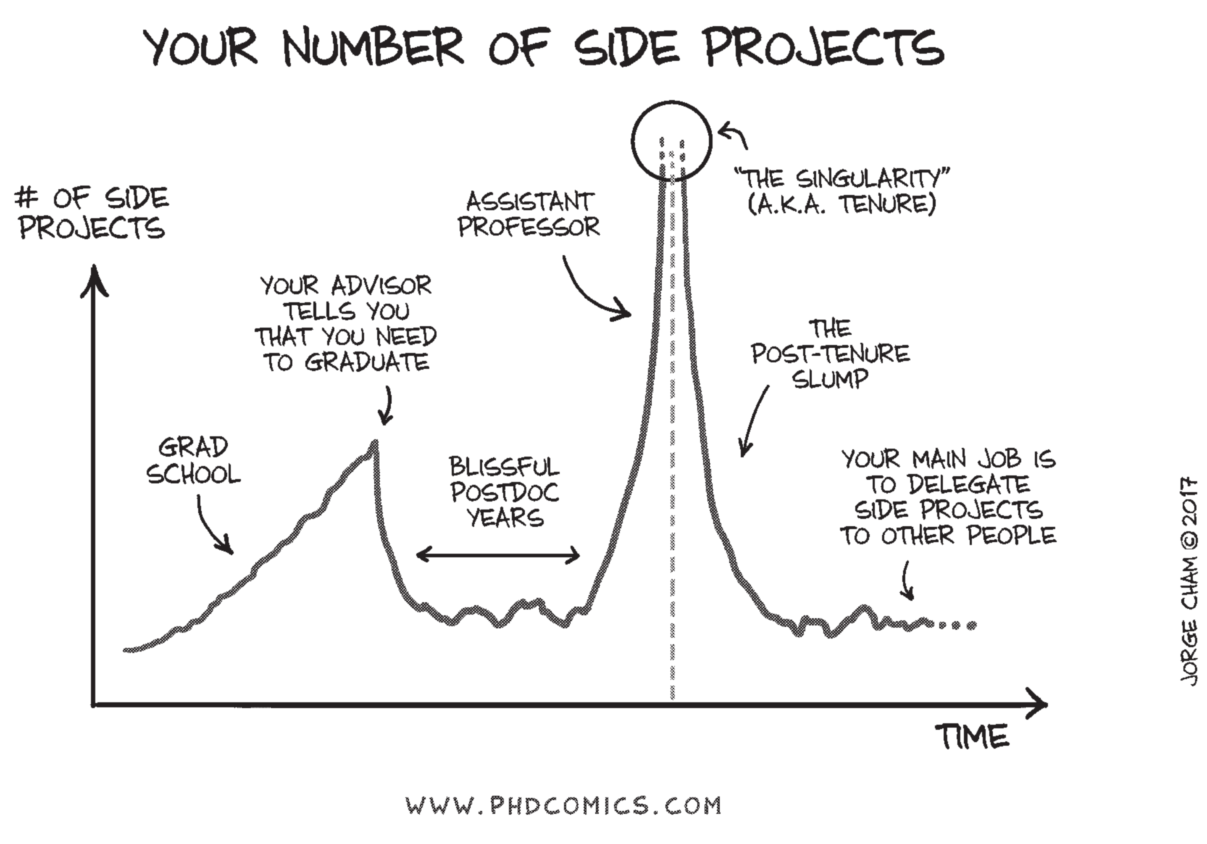
Solution, page 12

240×			25+			72×	18×	
7		4			54×			1
26+				72×		18+		
25+					12×	3		
	6–		54×			21+		
	8			8×		34+		
42×		27×			3–		8	
3			7–			20×		2÷
31+					5–			

Instructions: Fill in the grid so that each column and row contains exactly one of each of the numbers 1–9. Follow the mathematical operations for each box.



by Jorge Cham



Solution to Rose

from page 10

5	6	4	7	2	9	8	1	3
3	2	9	6	8	1	4	5	7
8	1	7	5	3	4	9	2	6
2	4	3	9	6	8	5	7	1
7	5	6	1	4	2	3	9	8
1	9	8	3	5	7	6	4	2
6	7	1	4	9	3	2	8	5
9	3	2	8	1	5	7	6	4
4	8	5	2	7	6	1	3	9

Solution to Violet

from page 10

2	4	6	1	5	3
4	6	2	3	1	5
1	3	5	6	4	2
5	1	3	4	2	6
6	2	4	5	3	1
3	5	1	2	6	4

Solution to Sunflower

from page 11

8	3	5	4	6	7	9	1	2
7	2	4	3	5	6	8	9	1
1	5	7	6	8	9	2	3	4
2	6	8	7	9	1	3	4	5
5	9	2	1	3	4	6	7	8
4	8	1	9	2	3	5	6	7
6	1	3	2	4	5	7	8	9
3	7	9	8	1	2	4	5	6
9	4	6	5	7	8	1	2	3

Solution to Devices

from page 9

■	O	D	D	S	■	A	L	P	S	■	F	L	A	T
O	P	R	A	H	■	W	E	E	P	■	L	A	T	E
P	R	O	M	O	■	A	N	T	I	■	O	B	O	E
T	Y	P	E	W	R	I	T	E	R	■	P	E	N	N
■	■	■	M	E	T	■	■	A	P	P	L	E	S	■
S	H	A	P	E	D	■	A	L	L	O	Y	■	■	■
W	I	S	H	■	S	O	S	O	■	E	D	G	E	D
A	D	I	O	S	■	U	S	A	■	T	I	A	R	A
M	E	A	N	T	■	C	E	N	T	■	S	L	I	M
■	■	■	O	A	T	H	S	■	U	P	K	E	E	P
S	I	N	G	T	O	■	■	O	N	E	■	■	■	■
O	D	O	R	■	P	H	O	N	E	B	O	O	T	H
N	A	N	A	■	O	U	R	S	■	B	R	I	E	R
I	H	O	P	■	F	L	E	E	■	L	A	N	E	S
N	O	S	H	■	F	A	S	T	■	E	L	K	S	■

Solution to Circus

from page 10

T	A	I	L	■	P	R	A	D	A	■	B	E	E	F
E	T	T	E	■	L	U	R	E	S	■	A	X	L	E
N	A	S	A	■	A	L	I	A	S	■	L	I	M	E
T	R	A	P	E	Z	E	A	R	T	I	S	T	■	■
H	U	G	■	A	A	S	■	■	■	R	A	V	E	D
S	N	O	O	T	■	■	P	U	C	K	■	I	V	E
■	■	■	R	E	A	L	I	S	M	■	A	S	I	A
H	U	M	A	N	C	A	N	N	O	N	B	A	L	L
O	P	A	L	■	T	I	T	A	N	I	C	■	■	■
W	O	N	■	S	I	R	S	■	■	C	S	P	A	N
S	N	E	A	K	■	■	■	A	R	E	■	A	D	O
■	■	■	U	N	I	C	Y	C	L	E	R	I	D	E	R
L	E	V	I	■	A	A	R	O	N	■	S	O	S	O
A	G	E	S	■	G	R	A	N	T	■	A	U	T	O
B	O	R	E	■	E	D	G	E	S	■	S	T	E	M