REU-CAAR: You’re Done!

William Gasarch-U of MD
Thanks to All Involved:

Clyde
He helped your talks be awesome!

Jodie
She got you paid.

John
He was my co-PI.

Really!
He did show up for the photo shoot.

What a Diva!
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**ALL OF YOU!** Without you there wouldn’t be a program!
Did the Program Achieve its Goals

1. None of the NSF-funded students died!
2. Bonus: None of the non-NSF-funded students died!
3. All students learned things. For some definition of learned.
4. All students did things. For some definition of did.
5. For all activities (Monday lunches, Wednesday talks, Wall climbing, Game night, Spy Museum, Runthroughs, Final talks) there exists a large fraction of students who both enjoyed them and benefited from them. For some definition of large.
6. Key-card access for people without non-IDs came today!
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Your Advice: Improve Lunch Activities

1. The Hat Problem: Students should have to wear hats.
   Bill's Response: How about Virtual Hats?

2. The Egg Problem: Students should get real eggs.
   Bill's Response: Okay, but if you drop them, you clean it up.

3. The Forehead Problem: Really write bits on foreheads.
   Bill's Response: Okay, but bring soap to wash them off later.

   Bill's Response: Next summer: 61 muffins for 19 people, cut so that everyone gets \( \frac{61}{19} \) and the smallest piece is \( \frac{313}{684} \).
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Advice: Too Much Bill

A Student Emailed

Bill ran six lunch activities. Is Bill (A) an egomaniac, or (B) a control freak?

Bill's Response

One from Column A, two from Column B.

Advice

It's worse than you think.

Of Bill's six lunches, five were "fun" math problems. Need more diversity of organizers and content. Next slide is about content.
Advice: Too Much Bill

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Advice: Other Activities

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Advice As noted on the last slide we could and should replace some of the “fun” math problem activities with other activities.

1. **Early on** Have a talk on **how to do research**.
2. **Later on** Have a talk on **how to give a good talk**.
3. **Sometime** A presentation from someone at NSA or NIST or Industry on what they do.
Advice: Comp Bio Interactions

A Student Email
The Wed talks on REU-CAAR stuff were awesome!

Also, would be good if we had more social interaction with the biocomp students.

Advice on Talks
I will talk to Mihai Pop (REU-BRIDGE director) about this. Also, for now here, What did you think of the biocomp talks?

Advice on Social Activities
Joint lunches. Cost issues.
I talked to Mihai Pop about chipping in some money. He will do so if the patent for the Fart-Analyzer makes money.
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Advice: Co-Mentors

1. Mentors who will not be there much should have grad student co-mentors picked out ahead of time and have more incentive to do a good job—either money or a project that is close to their research money, or both (as was the case with Auguste).

2. Students should have well defined projects from the very beginning. In a 10-week program you can't spend 2 weeks without direction.

Bill's Response

Agree of course. But getting mentors to do what they should is like:

▶ Pulling Teeth.
▶ Herding Cats.
▶ Pulling Cats Teeth.
Advice: Co-Mentors

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Advice: Swag

We should get UMCP Sweatshirts, Sweatpants, T-shirts, Mugs, Pens, Mousepads (Mousepads?), etc.

Bill's Response

This is not covered by NSF budget. But...

If we don't give housing to Ceaser then we would have more $$!

But that seems cruel.

Advice

Compromise:

▶ Don't give Ceaser housing, but give him a
▶ A free UMCP Sweatshirt.
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Advice: Reimbursements Unclear

A Student Email
How we get reimbursed was unclear and is still unclear.

Bill's Response
I have an explanation which is not an excuse:
The NSF changed how they did this.
Next year it should be better.
What about this year? If you are still confused then I will tell Sharron to send you a clarifying email.
**Advice: Reimbursements Unclear**

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Advice: Getting Const. Crit. from the Students

You would get a lot more and better responses if you asked for const crit anonymously.

Bill's Response
1. Whenever I do that I end up with much fewer responses.
2. Look at the responses I got this year:
   - Some Mentors BAD,
   - Bill's an Egomaniac/Control Freak,
   - The Biocomp Talks BAD,
   - Auguste's Muffins Awful.
   - Reimbursement was crappy.

   The students ARE speaking their mind.
   (Though I can't quite know that.)
3. If it's non-anon then I can respond to students and help us clarify the issue.
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   (Though I can’t quite know that.)

3. If its non-anon then I can respond to students and help us clarify the issue.
THOUGHT QUESTION

We had:

▶ Talks by the mentors (in the first two week)
▶ REU activity once a week (usually Monday)
▶ Spy Museum.
▶ Talks once a week (usually Wed)
▶ Two game nights
▶ Fairwell Talk (now!)
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Does this interfere with research?
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- Talks once a week (usually Wed)
- Two game nights
- Fairwell Talk (now!)

Does this **interfere** with research?
Should there be **less non-research stuff**?
Next Summer’s Projects

▶ Tom and Ian and Dave M:

- Project: Use ML, Crypto, and Comp Geom to figure out exactly what percent of life is just showing up.

▶ Bill and Andrew

- Project: Quantum Ramsey Theory.

Am I serious? Uncertain.
Next Summer’s Projects

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Next Summer’s Projects (cont)

A New Project:

Funded by The Winkler Foundation

Computing Fast Fourier Transforms:

Mentored by Furong ‘Vin Diesel’ Huang
Next Summer’s Projects (cont)

A New Project: Funded by The Winkler Foundation
Next Summer’s Projects (cont)

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Computing Fast Fourier Transforms:
Next Summer’s Projects (cont)

A New Project: Funded by The Winkler Foundation
Computing Fast Fourier Transforms:

Mentored by Furong ‘Vin Diesel’ Huang
Next Summer’s Projects (cont)

A New ML Project:

- If Bill can't tell Alex from Michael from Ben then that's funny.
- If Bill can't tell Yang from Hong then that's offensive.
- If Bill does not recognize Maya since she changed her hair then Emily is right, Bill is neurodivergent.
Next Summer’s Projects (cont)

**A New ML Project:** Train an ML to give the following responses:

- If Bill can’t tell Alex from Michael from Ben then that’s funny.
- If Bill can’t tell Yang from Hong then that’s offensive.
- If Bill does not recognize Maya since she changed her hair then Emily is right, Bill is neurodivergent.
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If Bill can’t tell Alex from Michael from Ben then that's *funny*.

If Bill can’t tell Yang from Hong then that's *offensive*.

If Bill does not recognize Maya since she changed her hair then *Emily is right, Bill is neurodivergent*. 
Next Summer’s Projects (cont)

A New Project:

Chaos theory. The Butterfly Effect.

Example:

Putin invades Ukraine → supply issues → 4105 has no projector → Grad School lunch in room where not allowed to eat lunch → Have box lunches that leave no trace of our criminal activity but are expensive → We go over budget → No Spy Museum next year. Which may be a good idea anyway.
Next Summer’s Projects (cont)

A New Project: Chaos theory. The Butterfly Effect. Example
Next Summer’s Projects (cont)

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Which may be a good idea anyway.
Number of Students

- Most REU programs have around 80 applying
- Most REU programs take 10 students
Number of Students

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- We have 210 applying.
- We take 19 students. And also had 3 HS students.
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Do I really want 22 students in Summer 2023?
Most REU programs have around 80 applying
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We have 210 applying.
We take 19 students. And also had 3 HS students.

Do I really want 22 students in Summer 2023?
If they are like you then **YES**
Number of Students

- Most REU programs have around 80 applying
- Most REU programs take 10 students

- We have 210 applying.
- We take 19 students. And also had 3 HS students.

Do I really want 22 students in Summer 2023?
If they are like you then **YES**

AWWWWWWWWW
REU programs: Ours and Others

red is what we do.
red is what we do.

► Topic Applying Theory to Practice, allegedly
REU programs: Ours and Others

**red** is what we do.

- Topic **Applying Theory to Practice, allegedly**
- **Umbrella** or focused
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▶ 8-12 people or 15-25 people
**REU programs: Ours and Others**

*red* is what we do.

- Topic **Applying Theory to Practice, allegedly**
- **Umbrella** or focused
- Bootcamp or **nobootcamp**
- 8-12 people or **15-25 people**
- **Projects picked ahead of time** or once you are there
Should the NSF Renew the Grant?

Your thoughts

PRO
- We bring in extra money for around 10 more students.
- Ten years. Experience and proven record.
- Very few REUs offers a quantum computing project.
- Very few REUs offers a Ramsey project. (Is that a PRO?)
- Many of our students go to grad school.
- Some of the projects lead to papers.

CON
- Scattered: Quantum! Crypto! ML! Ramsey Theory?
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My thoughts

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**PRO** Many of our students go to grad school.
**PRO** Some of the projects lead to papers.
**CON** Scattered: Quantum! Crypto! ML! Ramsey Theory?
Math Predictions

In the future

- A number $n$ is Maddy if $n \equiv 0 \pmod{3}$.
- A number $n$ is Maya if $n \equiv 1 \pmod{3}$.
- A number $n$ is Michael if $n \equiv 2 \pmod{3}$.
- A number $n$ is Alex if $n \equiv 2 \pmod{3}$.
- A number $n$ is Ben if $n \equiv 2 \pmod{3}$.
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In the future

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Math Predictions

In the future

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In the future

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Academic Predictions

In the spring of 1985 my advisor (Harry Lewis, Harvard) asked me what I dreamed of doing in the next 37 years. I said: Running an REU program where students do great projects and some even do real Ramsey Theory! Thank you REU-2022 for making my dream come true!
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1. Positive thoughts or stories about the program.
2. Tell me something interesting.
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2. Tell me something interesting.

Since I am a **Egomaniac** and **Control Freak**
I will go first.
1. Positive thoughts or stories about the program.
2. Tell me something interesting.

Since I am a **Egomaniac** and **Control Freak**
I will go first. And give two of each.
Positive Things About the Program

1. Great to be IN PERSON. I had forgotten how much better that was. This talk- inside jokes, personal interactions, was not possible the last two years.

2. Great Talks! Great Research! Auguste!
Interesting Fact One

In the form of a question:
What do the following people have in common:

1. Actor Clint Eastwood.
2. Singer Dolly Parton.
4. Fictional Cartoon Character Steven Universe.
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They were all born with great stage names.
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**Side Note** Stage names are often middle names followed by a street you live on. For me this works great:
Interesting Fact One

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**William Gasarch** becomes **Ian Marlow**.
What do the following sentences have in common:

1. Pack my box with five dozen liquor jugs.
Interesting Fact Two

What do the following sentences have in common:

1. Pack my box with five dozen liquor jugs.
2. Amazingly few discotheques provide jukeboxes.
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What do the following sentences have in common:

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   That should have been the ad slogan for watching Jeopardy.
   And now it can’t be :-(

In all of them every letter appears at least once. Used as counterexample to freq analysis in crypto. See next slide for more.
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Lipograms

1. Gadsby is a 50,000-word novel with no 'e's in English. This inspired a French novel, A Void that also has no 'e's.
2. Many book reviews of Gadsby and A Void used no 'e's.
3. Eunoia is a 5-chapter novel, indexed by vowels. Chapter A only use the vowel A, etc.
4. How I met your mother, Season 9, Episode 9: Lily and Robin challenge Barney to get a girl's phone number without using the letter 'e'.
Lipograms: A work that omits one letter.
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