15-410

How to Ask Questions
Aug. 30, 2024

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Synchronization

Wait list

- There are still some people on the wait list I would *like* to add...
  - But I don't have the space yet(?)
  - If you are in the class and not committed to completing it, dropping *right away now* would help some people who are still wait-listed...

Office hours

- The office-hours schedule contains multiple entries!

Semester schedule

- Reading schedule is already released
- Assignment schedule hopefully this weekend

Please don't try to do P0 in a single last-minute rush

Survey!

How many of you swap Control and Caps lock?

Warning / Encouragement

This material will seem weird

We expect you to deploy it anyway!

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You are in this class to *become different*

- Maintaining your pre-existing business model is "not a growth strategy"

Warning / Encouragement

This material will seem weird

We expect you to deploy it anyway!

You are in this class to *become different*

- Maintaining your pre-existing business model is "not a growth strategy"

Hey, could some of this weird stuff show up on an exam?

12

Outline

I don't get _____.

Can I assume _____?

Is this the right way to _____?

I can't decide between _____ and _____.

Q1: "I don't get _____"

What you ask us

- **I don't get _____**

Q1: "I don't get _____"

What you ask us
- I don't get _____

The problem we fear
- Insufficient synthesis

15

Q1: "I don't get _____"

What you ask us

- I don't get _____

The problem we fear

- Insufficient synthesis
  - Textbook
  - "Regular" (inter-project) lectures
  - Project-specific lecture
  - Project specification, project handout
  - Test code (reading during *design* can be good)
  - Material on "projects" web page of course web site

16

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How to help us with our fears

- "I read X and Y. I think I understand Z, but I don't see how to apply W."
- "When the spec says ___, I can't tell whether that means ___ or ___ because ___."

17

Q1: "I don't get _____"

How to help us with our fears

- "I read X and Y. I think I understand Z, but I don't see how to apply W."
- "When the spec says ___, I can't tell whether that means ___ or ___ because ___."

18

Q1: "I don't get _____"

How to help us with our fears

- "I read X and Y. I think I understand Z, but I don't see how to apply W."
- "When the spec says ___, I can't tell whether that means ___ or ___ because ___."

Asking questions based on quotes seems weird

- We expect you to practice it even if it seems weird!

Q2: Can I assume _____?

What you ask us

- **Can I assume _____?**

Q2: Can I assume _____?

What you ask us
- Can I assume _____?

The problem we fear
- Missed opportunity for design

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What you ask us
- Can I assume _____?

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How to help us with our fears
- Ask *yourself* these two questions instead
  - Q2': If I assume _____ *and I'm wrong*, what will happen?
  - Q2'': If I *don't* assume _____, what is the penalty?

Q2: Can I assume _____?

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The problem we fear

- **Missed opportunity for design**

How to help us with our fears

- **Ask *yourself* these two questions instead**
  - **Q2': If I assume _____ *and I'm wrong*, what will happen?**
    » **A1: "The world will end" ⇒ ...?**
    » **A2: "Maybe I must complain to user" ⇒ ...?**

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    - » A1: "Must do 1 more XOR" ⇒ ...?
    - » A2: "Must do $O(N^{12})$ graph scan" ⇒ ...?

27

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  - **Q2": If I *don't* assume _____, what is the penalty?**
    - » **A1: "Must do 1 more XOR" ⇒ maybe not assume**
    - » **A2: "Must do $O(N^{12})$ graph scan" ⇒ ok to assume?**
- **No need to ask about: "World will end" + "save 1 XOR"**

29

Q2: Can I assume _____?

Word shaving

- **I am assuming _____ …**
- **Is it reasonable to conclude _____ ?**

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Word shaving

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- **Is it reasonable to conclude _____ ?**

The problem isn't specific _phrasing!_

- **The problem is that you need to split the one "natural" question into two _unnatural_ questions!**

Q2: Can I assume _____?

Word shaving
- I am assuming _____ …
- Is it reasonable to conclude _____ ?

The problem isn't specific *phrasing!*
- The problem is that you need to split the one "natural" question into two *unnatural* questions!

Re-writing "Can I assume ___?" seems weird
- We expect you to practice it anyway!

Q3: Is this the right way to _____?

What you ask us

- **Is this the right way to _____?**

Q3: Is this the right way to _____?

What you ask us

- Is this the right way to _____?

The problem we fear

- You believe there is *one* right way to _____.

34

Q3: Is this the right way to _____?

What you ask us

- Is this the right way to _____?

The problem we fear

- You believe there is *one* right way to _____.
  - Usually, there are several
  - Generally our assignments are designed to have multiple good solutions

35

Q3: Is this the right way to ____?

What you ask us

- **Is this the right way to ____?**

The problem we fear

- **You believe there is *one* right way to ____.**
  - **Usually, there are several**
  - **Generally our assignments are designed to have multiple good solutions**

How to help us with our fears

- **Figure out *two or three* ways to ____**
  - **Often one will seem clearly better than the other(s)**
  - **Regardless, you will almost certainly understand the problem better**
  - **But sometimes you may end up having to make a tough decision...**

Q4: I can't decide between X & Y

What you ask us

- **I can't decide between X and Y**

Q4: I can't decide between X & Y

What you ask us

- I can't decide between X and Y

The problems we fear

- You believe that we believe X (or Y) is "the right answer"
  - Again, we try *not* to do this
- Missed opportunity for design

Q4: I can't decide between X & Y

What you ask us

- I can't decide between X and Y

The problems we fear

- You believe that we believe X (or Y) is "the right answer"
  - Again, we try *not* to do this
- Missed opportunity for design

How to help us with our fears

- Show us a table!

Q4: I can't decide between X & Y

	Proposal X	Proposal Y
Weight	17	34
Complexity	$O(N^2)$	$O(N^{1/2})$

Which to pick?

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Which to pick?

Q4: I can't decide between X & Y

	Proposal X	Proposal Y
Cost	$5	$5,000
Complexity	$O(N^2)$	$O(N^{1/2})$

How to pick?

- "Voting" by counting boxes often doesn't work

Q4: I can't decide between X & Y

	Proposal X	Proposal Y
Cost	$5	$5,000,000
Complexity	$O(N^2)$	$O(N^{1/2})$

How **to pick?**

- **Sometimes counting boxes** ***really*** **doesn't work!**

Q4: I can't decide between X & Y

	Proposal X	Proposal Y
Cost	$5	$5,000,000
Complexity	$O(N^2)$	$O(N^{1/2})$

Conclusion

- **Proposal X, because the value of "Cost" for Proposal Y is outside of our budget for this year**

Q4: I can't decide between X & Y

	Proposal X	Proposal Y
Cost	$5	$5,000,000
Complexity	$O(N^2)$	$O(N^{1/2})$

Note!

1. Table is *strictly better than* "a list of pros and cons"
2. Rationale generally involves prioritizing (metric,value)

Detailed Example Follows

Disclaimers

My personal opinion, based on my experiences

Sample size = 1

Your experience may vary

Bluetooth Headsets

	Sony DR-BT50
Range	6 ft
Controls	Ok

Bluetooth Headsets

	Sony DR-BT50
Range	6 ft
Controls	Ok

Mission

- **More range!**

Bluetooth Headsets

	Sony DR-BT50	JBL E50BT
Range	6 ft	30 ft
Controls	Ok	Great!

But...

- **A row was missing!**

Bluetooth Headsets

	Sony DR-BT50	JBL E50BT
Range	6 ft	30 ft
Controls	Ok	Great!
Robust?	Yes	Crumbled

Bluetooth Headsets

	Sony DR-BT50	JBL E50BT
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Conflict!!!
- **What to do???**

Bluetooth Headsets

	Sony DR-BT50	JBL E50BT	
Range	6 ft	30 ft	
Controls	Ok	Great!	
Robust?	Yes	Crumbled	

Conflict!!!
- **What to do???**

ADD A COLUMN!

Bluetooth Headsets

	Sony DR-BT50	JBL E50BT
Range	6 ft	30 ft
Controls	Ok	Great!
Robust?	Yes	Crumbled

Mission

- **More range!**
- ***And* robust!**

Bluetooth Headsets

	Sony DR-BT50	JBL E50BT	Anker Life Q20
Range	6 ft	30 ft	25 ft
Controls	Ok	Great!	Ok
Robust?	Yes	Crumbled	Maybe?
Status Sounds	Ok	Good	Ok-ish

Bluetooth Headsets

	Sony DR-BT50	JBL E50BT	Anker Life Q20
Range	6 ft	30 ft	25 ft
Controls	Ok	Great!	Ok
Robust?	Yes	Crumbled	Maybe?
Status Sounds	Ok	Good	Ok-ish
BT HSP?	Yes	Yes	No

56

Bluetooth Headsets

	Sony DR-BT50	JBL E50BT	Anker Life Q20
Range	6 ft	30 ft	25 ft
Controls	Ok	Great!	Ok
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Mission

- **More range**
- **Robust**
- **HSP**

Bluetooth Headsets

	Sony DR-BT50	JBL E50BT	Anker Life Q20	V-Moda Crossfade
Range	6 ft	30 ft	25 ft	25 ft
Controls	Ok	Great!	Ok	
Robust?	Yes	Crumbled	Maybe?	Yes?
Status Sounds	Ok	Good	Ok-ish	
BT HSP?	Yes	Yes	No	Yes

58

Bluetooth Headsets

	Sony DR-BT50	JBL E50BT	Anker Life Q20	V-Moda Crossfade
Range	6 ft	30 ft	25 ft	25 ft
Controls	Ok	Great!	Ok	Borderline
Robust?	Yes	Crumbled	Maybe?	Yes?
Status Sounds	Ok	Good	Ok-ish	Boisterous
BT HSP?	Yes	Yes	No	Yes

59

Bluetooth Headsets

	Sony DR-BT50	JBL E50BT	Anker Life Q20	V-Moda Crossfade
Range	6 ft	30 ft	25 ft	25 ft
Controls	Ok	Great!	Ok	Borderline
Robust?	Yes	Crumbled	Maybe?	Yes?
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BT HSP?	Yes	Yes	No	Yes

[Returned _my_ V-Moda Crossfade due to a manufacturing defect]

Bluetooth Headsets

	Sony DR-BT50	JBL E50BT	Anker Life Q20	V-Moda Crossfade	Pioneer SE-MS9BN
Range	6 ft	30 ft	25 ft	25 ft	25 ft
Controls	Ok	Great!	Ok	Borderline	Ok
Robust?	Yes	Crumbled	Maybe?	Yes?	Yes?
Status Sounds	Ok	Good	Ok-ish	Boisterous	Ok
BT HSP?	Yes	Yes	No	Yes	Yes

61

Observations

"Pros and cons" is *not a good idea*

Expect iteration!

- Metrics may not be obvious up front!
- Values may not be obvious up front!
- *Always* look for more approaches (columns)
- Adding rows and columns triggers research
  - This is good!

Observations

"Pros and cons" is *not a good idea*

Expect **iteration!**

- Metrics may not be obvious up front!
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- *Always* look for more approaches (columns)
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Prefer numerical values when possible

- Numerical is arguably best
- O() notation maybe next?
- Qualitative reactions can be ok
- Booleans can be ok, but may be hiding something
- Other values should be viewed with suspicion
  - "Solves the problem" in a cell indicates a mistake

63

Observations

Be specific!

- Avoid: "freeing of resources"
- Better: "freeing of player struct"

What about non-working "solutions"?

- Documenting a partial solution can be helpful while brainstorming
- If you have two non-working proposals and one working proposal, probably design should continue
  - The goal is to find multiple *working* solutions and pick one

Observations

Conclusion form

- **Avoid**
  - **We picked X.**
  - **We picked X because it was the only correct solution.**

Observations

Conclusion form

- **Avoid**
    - **We picked X.**
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- **Prefer**
    - **We picked X because value V1 for M1 is unacceptable for the expected workload.**
    - **We picked X because (M1, V1) is more important than (M2, V2).**

Observations

Conclusion form

- **Avoid**
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Using a *matrix* to make a *decision* seems weird

- We expect you to practice it anyway!

Observations

Conclusion form

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Using a *matrix* to make a *decision* seems weird

- We expect you to practice it anyway!
  - P0 *can* be done without a matrix... to some extent
  - P0 and P1 are a great time to *practice* before P2 & P3

Conclusion

Suggestions

- **Make sure you read everything**
- **Ask detailed questions that refer to handout, spec, etc.**
- **Ask multi-dimensional questions about assumptions**
- **Try to find multiple solutions to a tough problem**
  - **When choosing, try to have a rationale**
  - **If you write down a summary after each choice, you have a "design document"!**

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Note!

- **We expect *you* (personally) to carry out these procedures!**
  - **Not ask "Is it ok to assume _____?"**
  - **Not list "pros and cons"**

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Note!

- **We expect *you* (personally) to carry out these procedures!**
  - **Not ask "Is it ok to assume _____?"**
  - **Not list "pros and cons"**
- **These procedures *may appear on an exam question***
  - **"Is it ok to assume _____?" will not get full credit**
  - **"Pros and cons" will not get full credit**

71