MAKING SENSE OF CATEGORICAL DATA

question confusion

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Task:

Women who volunteered for the military service

		Systolic blood pressure		Total
		Not high	High	
Gestational age at birth	Born pre term (< 37 wks)	257	42	**299**
	Born term or post term (≥37 wks)	4533	400	**4933**
	Total	**4790**	**442**	**5232**

Question: Who is more likely to have high blood pressure? Women who were born pre-term or women who were born term or post?

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Pilot study: Investigate students' reasoning about categorical variable displays

- Participants
  - Two undergraduate statistics students
  - Have done some statistics at school and university level
- Scenarios involving two categorical variables
  - Gender (M/F) vs Student loan (Loan_T: Yes/No)
  - Gender (M/F) vs Time spent on social media a day (<1 hr, 1-3 hr, 3-6 hr, >6 hr)

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(con't)

- Task
  - Pose investigative questions about the two variables
  - Draw displays to represent the two variables separately then combined
  - Use own representations or pre-prepared representations (e.g., bar graphs) to answer questions
- Study
  - Two two-hour sessions with a pair of students working together

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Pilot study – what we found

- Similar issues – posing questions and selecting the correct representation
- Common interest – There is a type of question students like to ask
  - Comparison question for comparing groups
  - E.g., 'Who is more likely' to purchase alcohol? Male or Female?'
- Confusion in answering

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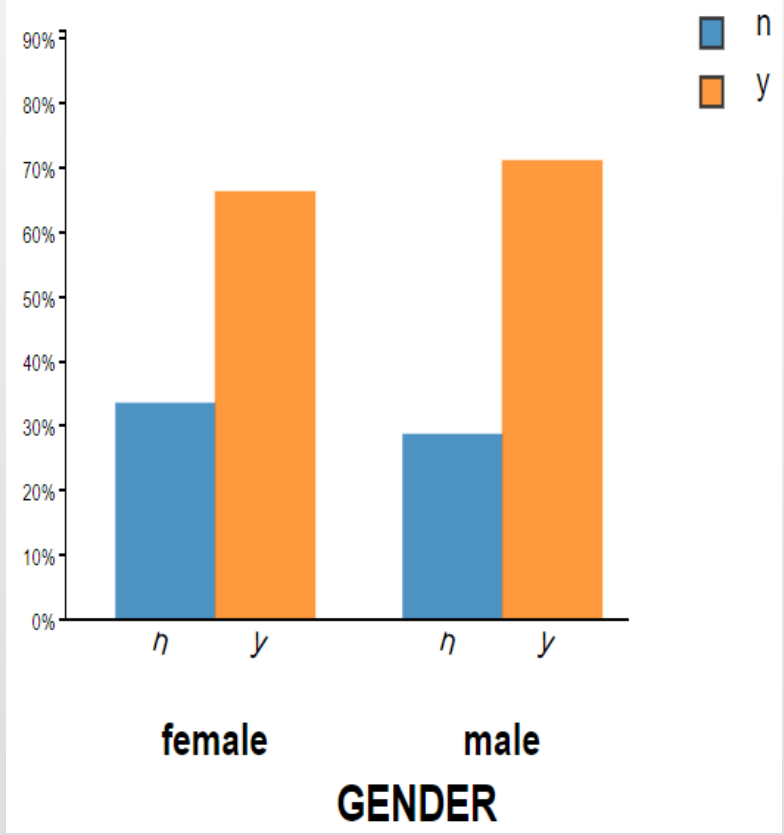
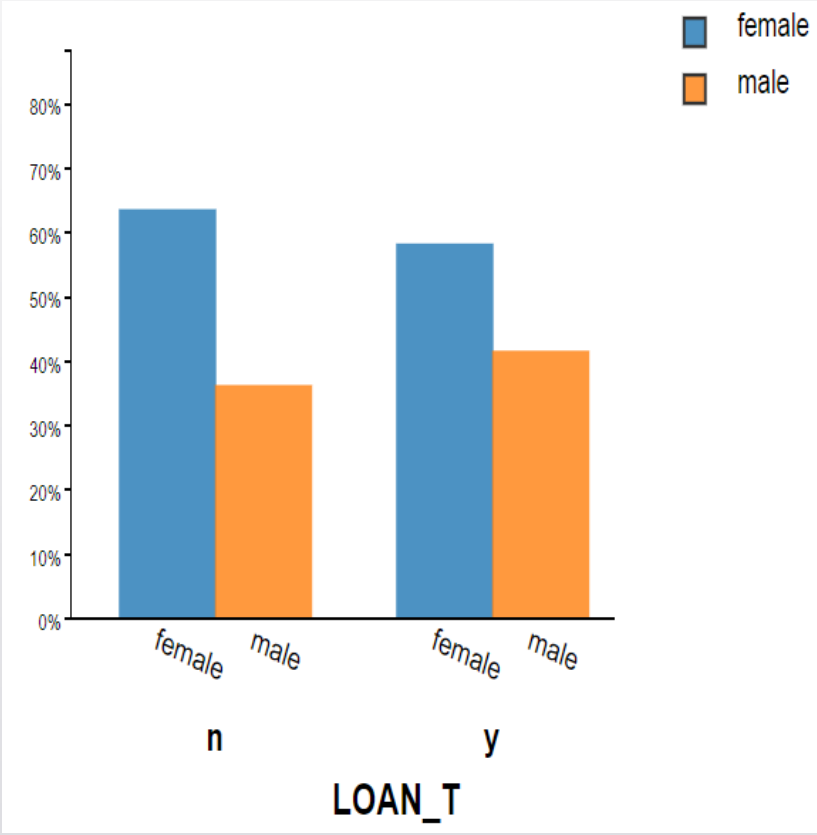
Posing question ➔ Selecting representations to answer the question

Who is more likely to have a student loan out of male and female?



a.

Sera: If you compare these two together [b] then it's more likely for females to have a student loan, and then compare these two [a] to say that it's more likely for males than females to have a student loan.



b.

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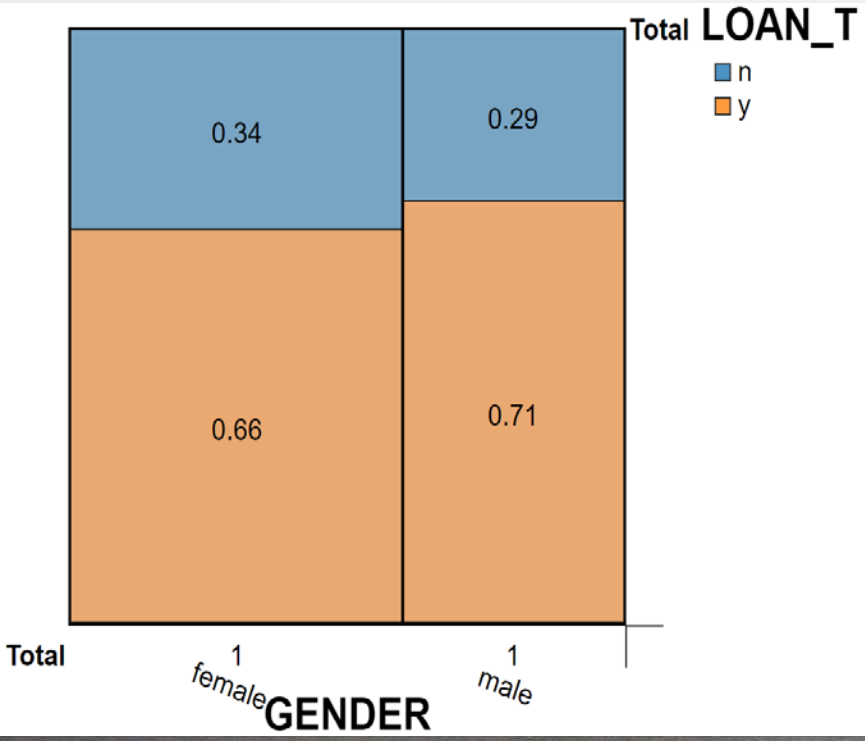
(Con't)

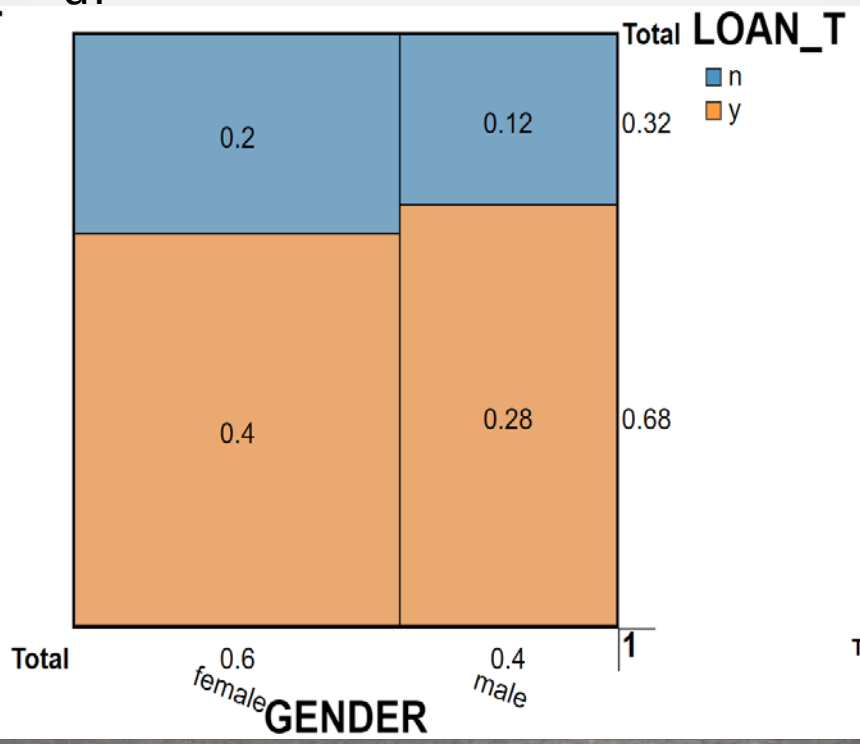
Tara: I like things out of 100 instead of technically 60 [opting to use (c) rather than (d)] because if you go out of 100 then you can use percentages and turn it into a decimal, whereas 0.4 out of 0.6 is kind of … I was going to say it is 71% of males have a student loan.

[looked at e] That's so weird but that makes sense because you go this way so you are comparing 0.4 with 0.28 [d]. You can move across… comparing them down [e] and so yeah, females would be more likely to have a student loan.

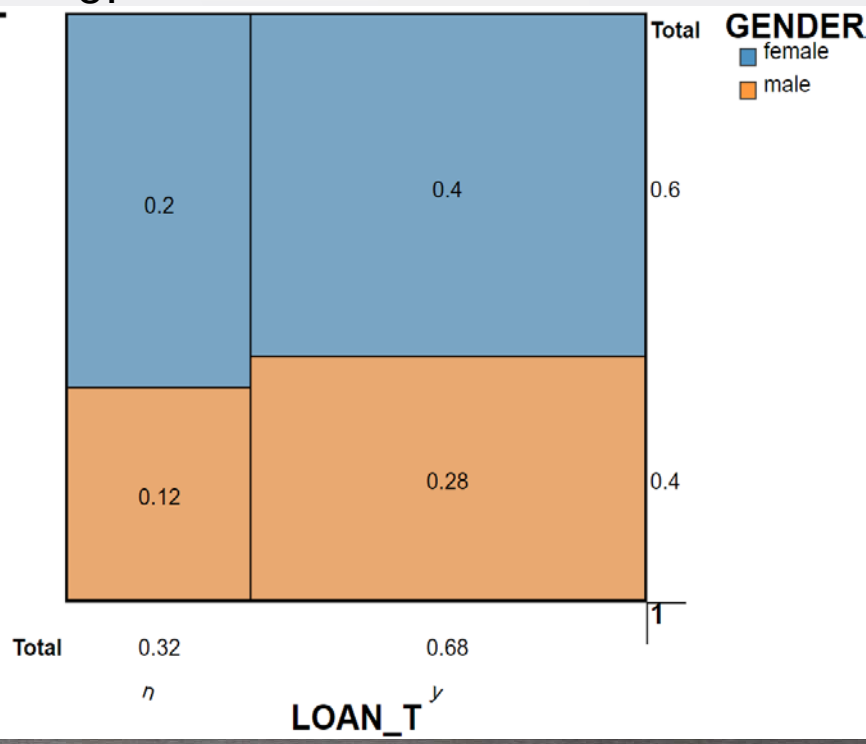
c.



d.



e.



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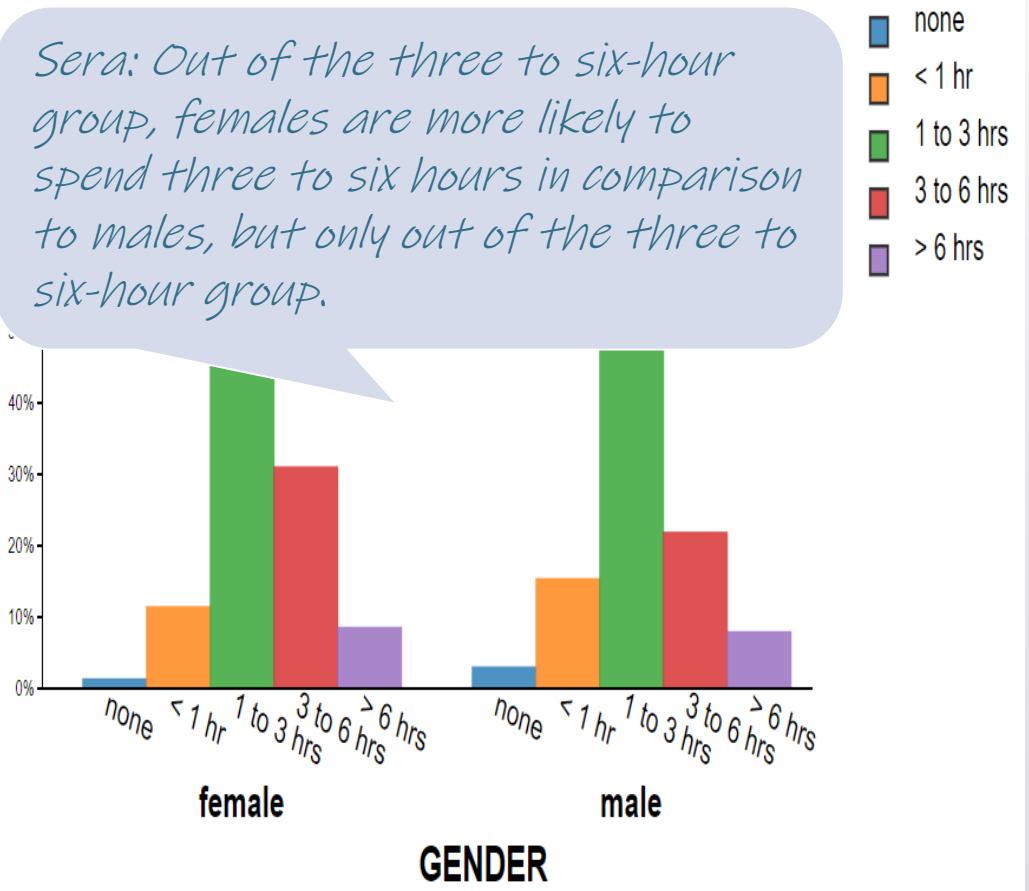
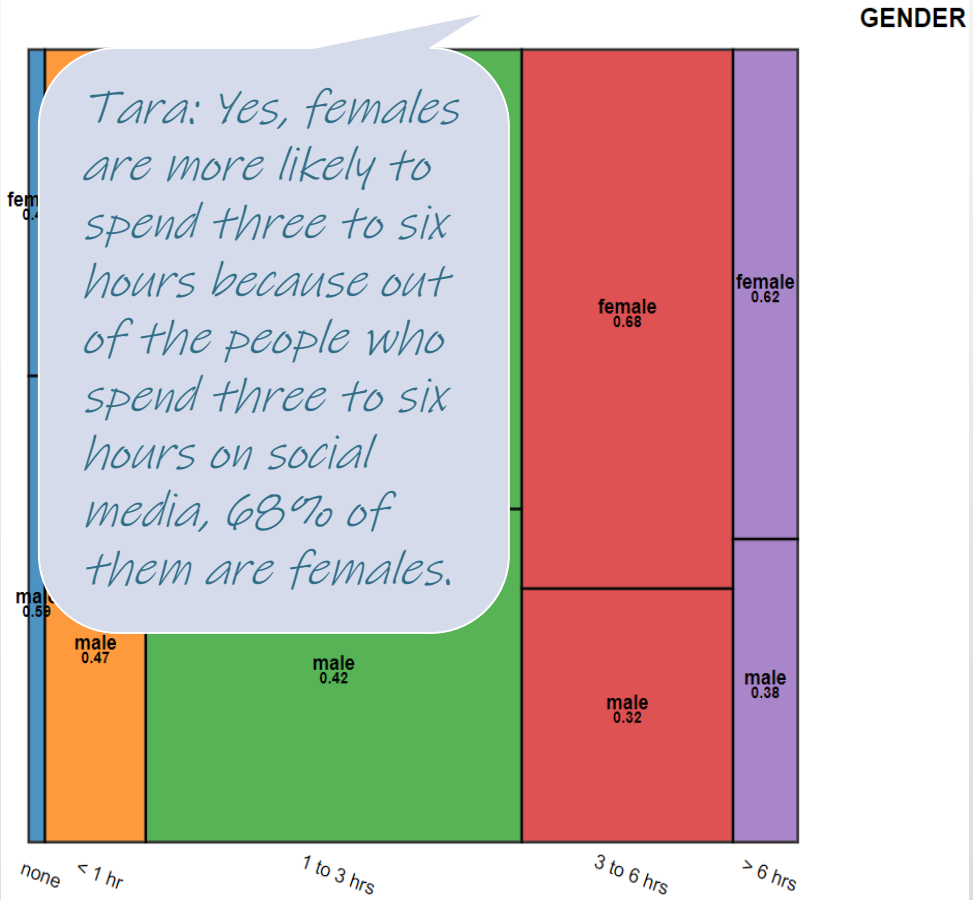
Interpreting representations ➔ Posing questions

Who is more likely to spend 3-6 hours on social media a day out of male and female?

Sera: Out of the three to six-hour group, females are more likely to spend three to six hours in comparison to males, but only out of the three to six-hour group.



Tara: Yes, females are more likely to spend three to six hours because out of the people who spend three to six hours on social media, 68% of them are females.



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Conclusion

- Students like to ask comparison questions
  - Interesting
  - A more natural way
- Confusion in answering comparison questions
- Teaching implications
  - Focus to be on answering comparison questions
  - Pose questions clearly as to whether to compare between conditions or within conditions

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