Rational, motivated students and suitable Units:

Detecting suspected contract cheating for unsupervised written assignments

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Presentation at the WA Forum on Contract Cheating

Curtin University, WA

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Estimating the size of the problem

- Because a third-party has produced an original piece of work, plagiarism detection software doesn't work

- Some previous research has looked at how often the same users requested assistance from third-parties for computer code (Lancaster & Clarke, various)
  - Found repeat users
  - 2 month period, 54% of users made between 2 and 7 bid requests
  - 6 users made 51 or more bid requests

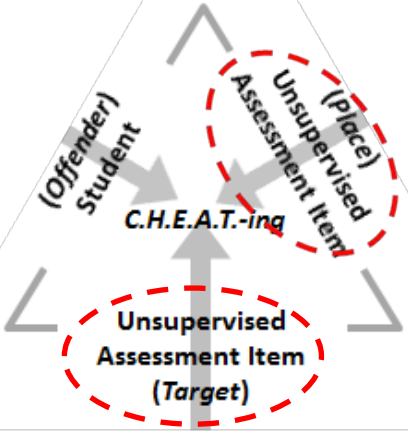
- Survey of students in Australia (Curtis & Vardanega, in press) found relatively steady prevalence rates for contract cheating
  - 3.1% at least once in 2004 compared to 2.8% in 2014

What is this talk about?

- Looking at the issue of contract cheating from an opportunity theory perspective
  - Can data identify students who use **C**omputers to **H**elp **E**vade **A**vailable **T**echnology (aka C.H.E.A.T.)?
- An opportunistic analysis of some student data from Murdoch University
- Interesting patterns…
- If we buy the first part, what does this mean for the second part?
  - Targeted prevention at the student-, assessment item-, Unit-, and university-level
  - Next steps

Opportunity expects some people to C.H.E.A.T.?

- C.H.E.A.T.-ing: possible when three elements combine in time and space
  - A rational, motivated *student*
  - A suitable *unsupervised assessment item*
  - The absence of a capable guardianship



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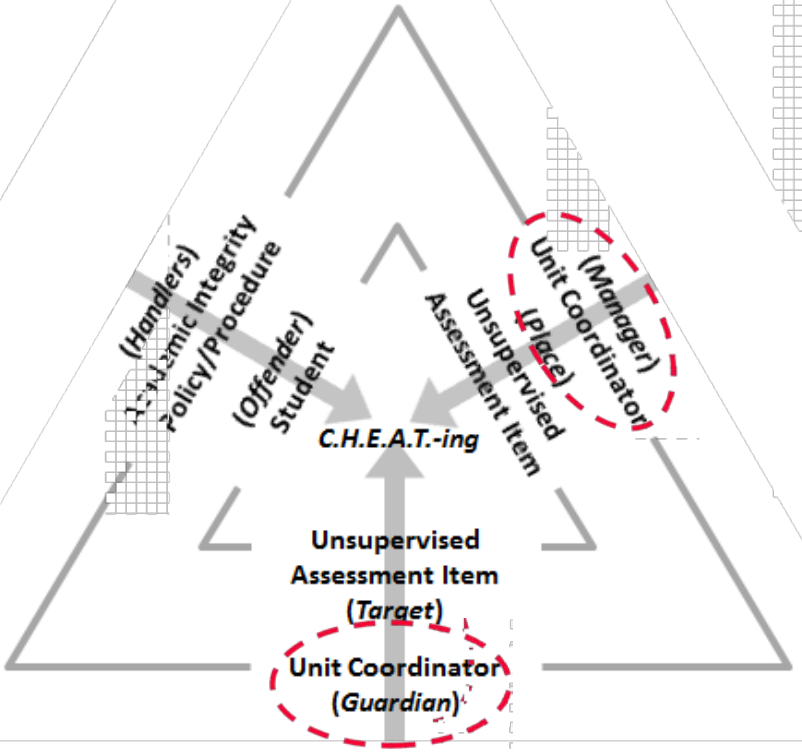


How can we use data to examine this?

- Is there any proxy for C.H.E.A.T.-ing that could be used from available data?
  - E.g., parking in disabled bays has been used to identify chronic repeat offenders via *self-selection* (Pease and colleagues)
- What about differences in performance for the same student between supervised and unsupervised assessment items?
  - If people are submitting paid work from third-parties they should do better on unsupervised essays relative to supervised exams
- Based on other 'problem' patterns we'd expect to see
  - A general non-randomness of these patterns
  - Repeat targets/locations (some assignments are more suitable than others)
  - Repeat offenders (some students are more *motivated* to cheat that others)

Exploring this idea

- 2015 data for Units completed in the Law School at Murdoch
  - 3,798 results
  - 1,459 students
  - Average 2.6 units per student
  - Range from 1 unit to 9 units completed
- Units offered in a few major discipline areas
  - Criminology
  - Law
  - Legal studies
  - University breadth units
- Data on supervised and unsupervised assessment items
  - Converted to percentages

What would be weird?

- Used 4 different risk rules to find 'unusual' patterns between supervised and unsupervised assessment items

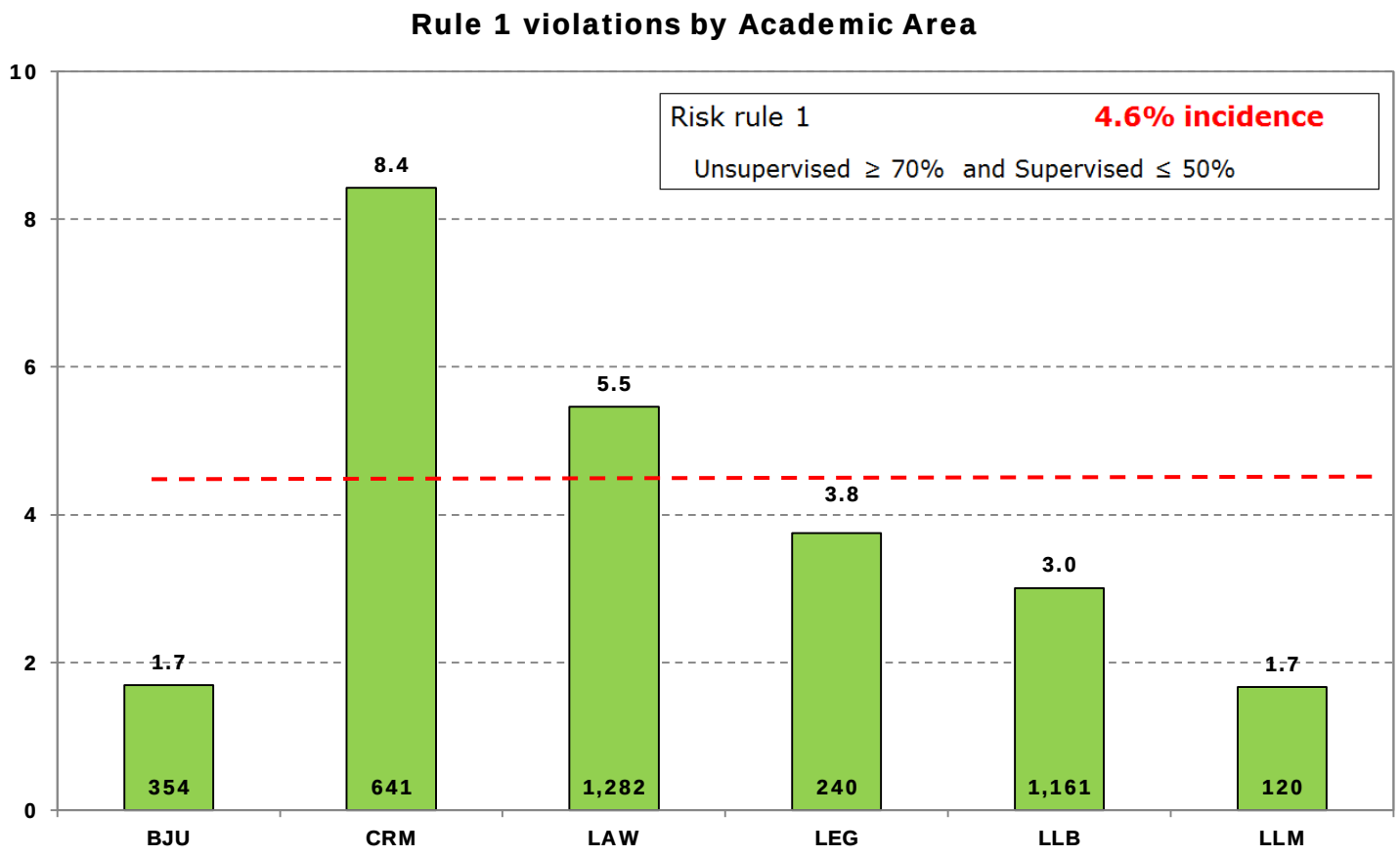
- Risk rule 1 **4.6% incidence**
  - Unsupervised ≥ 70% and Supervised ≤ 50%

- Risk rule 2 **8.1% incidence**
  - (Unsupervised – Supervised) ≥ 25 percentage points

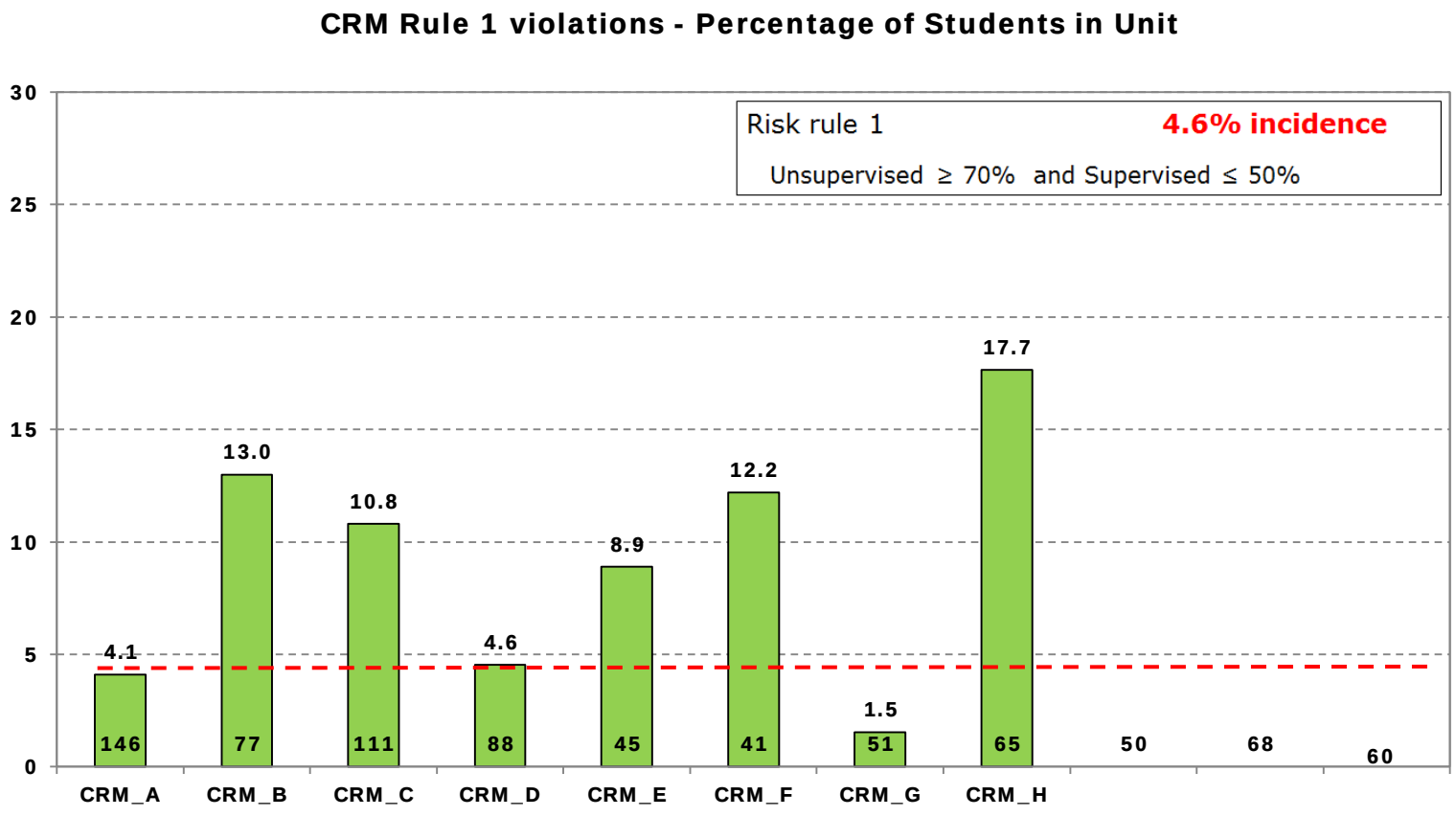
- Risk rule 3 **0.7% incidence**
  - Unsupervised ≥ 80% and (Unsupervised – Supervised) ≥ 40 percentage points

- Risk rule 4 **0.7% incidence**
  - Unsupervised ≥ 60% and Supervised ≤ 30%

Clustering between disciplines: Rule 1 variation



Clustering within discipline: unit-level Rule 1 variation



High overall Discipline incidence, but still not all Units

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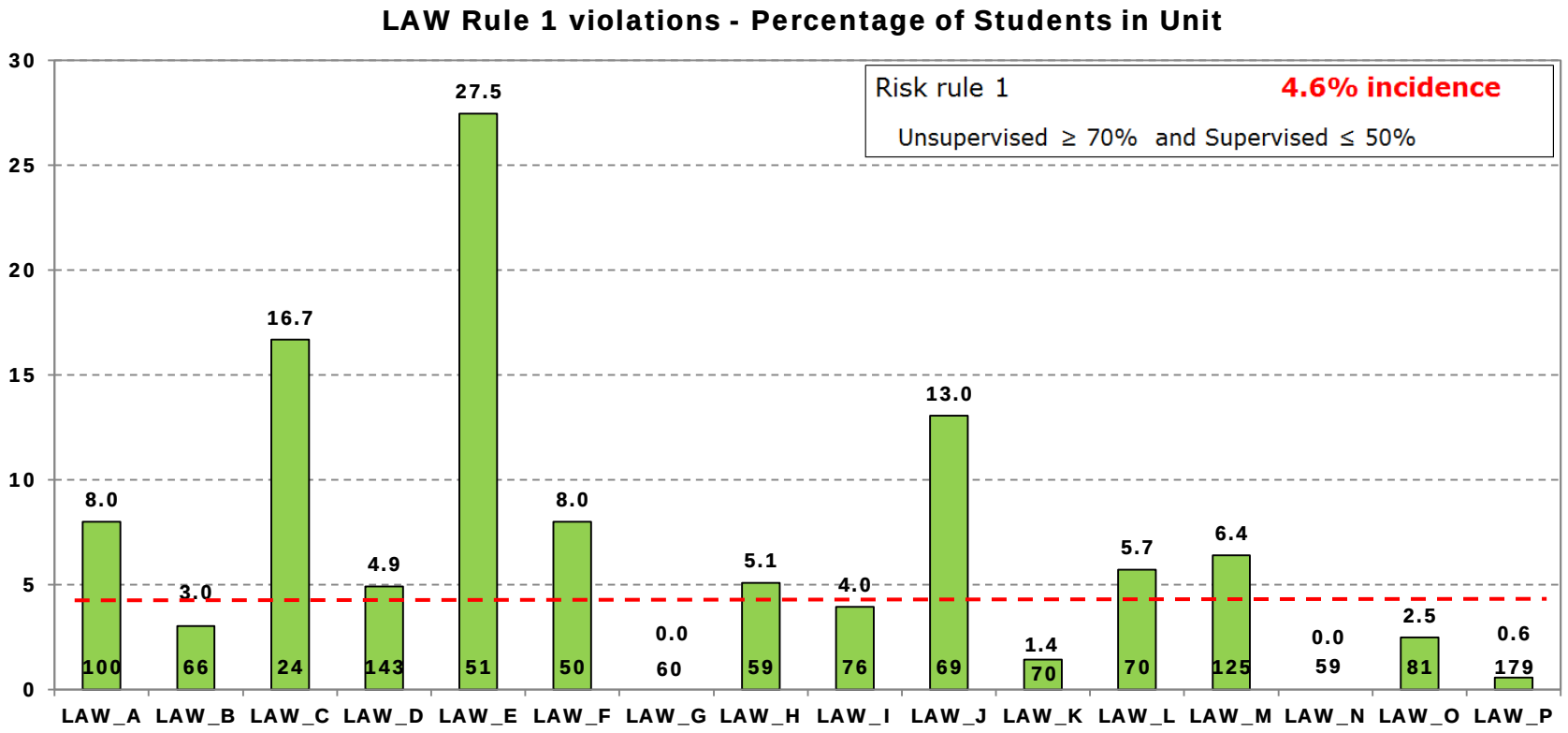

Average overall incidence at discipline level – large variation across Units

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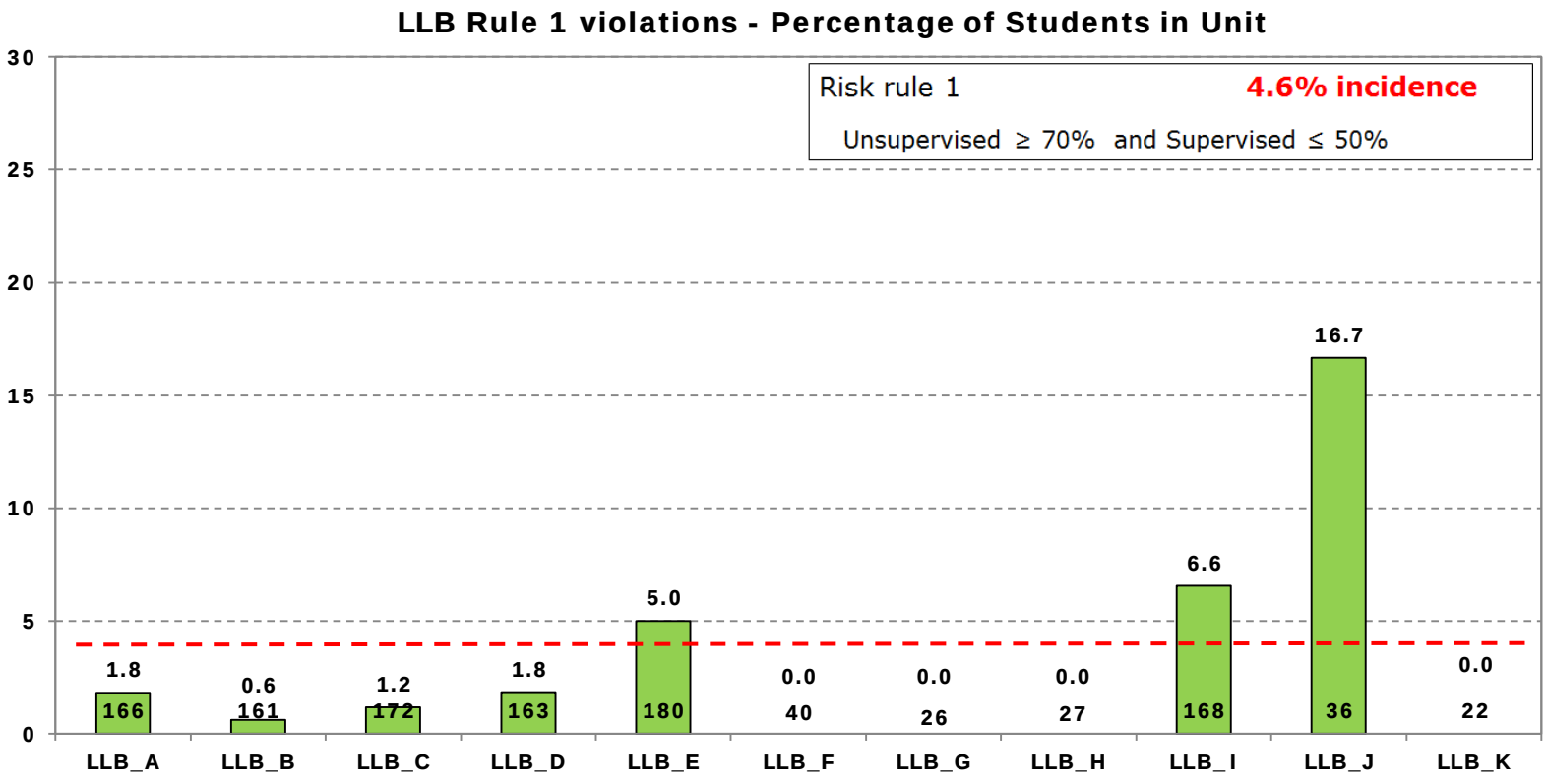
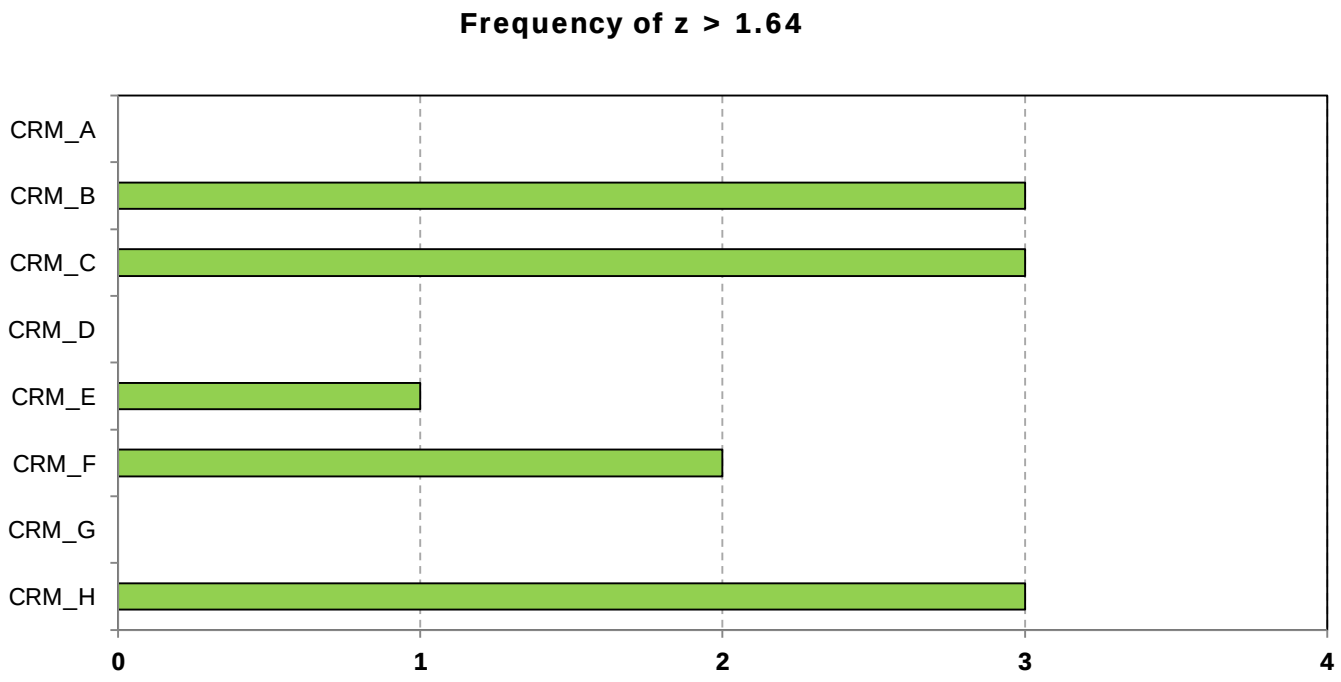


Low overall incidence at discipline level – still some Units with unusual patterns

Combining rule variation at the unit-level

- Calculated the within-Unit incidence percentage as a ratio to the overall average rule violation for each rule
  - Counted if *z*-score > 1.64 relative to all other units



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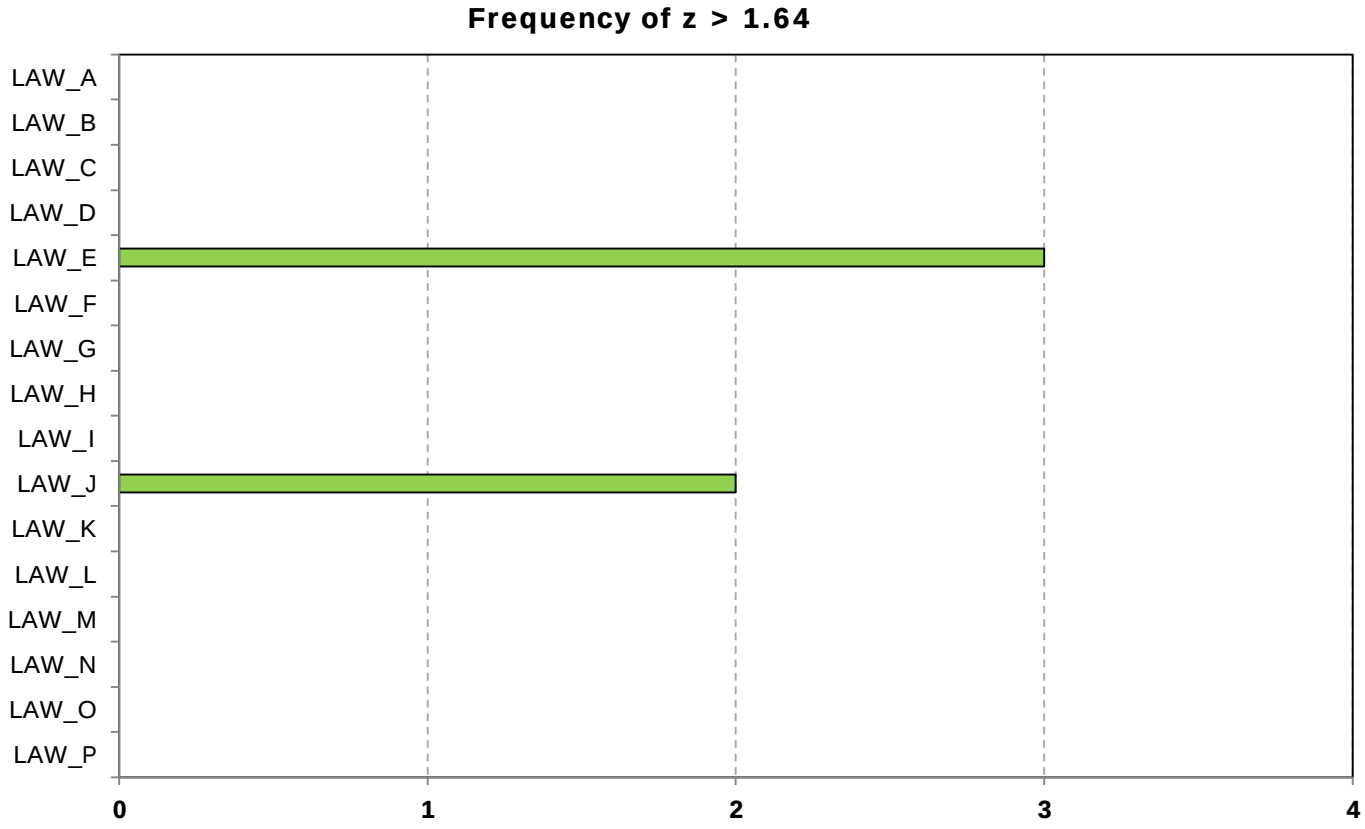
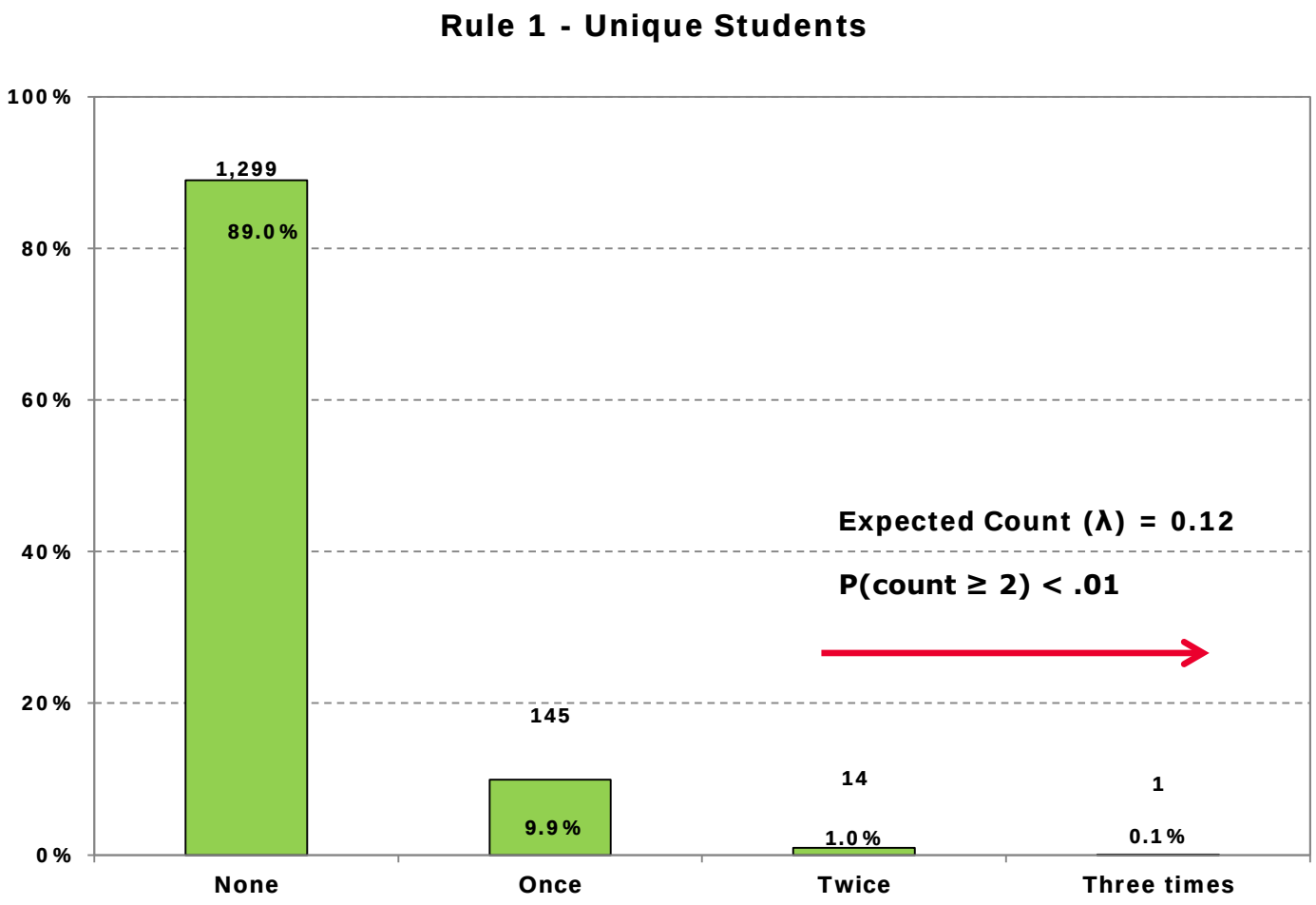


Within-student clustering across rules



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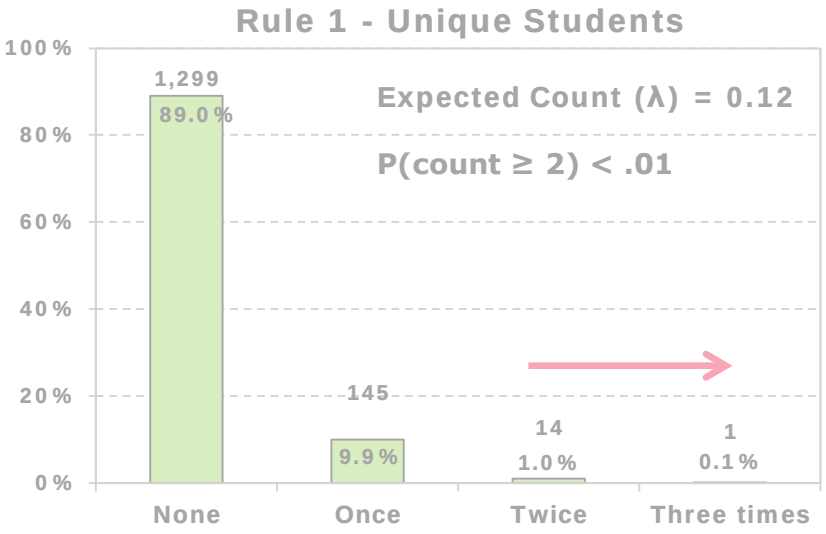

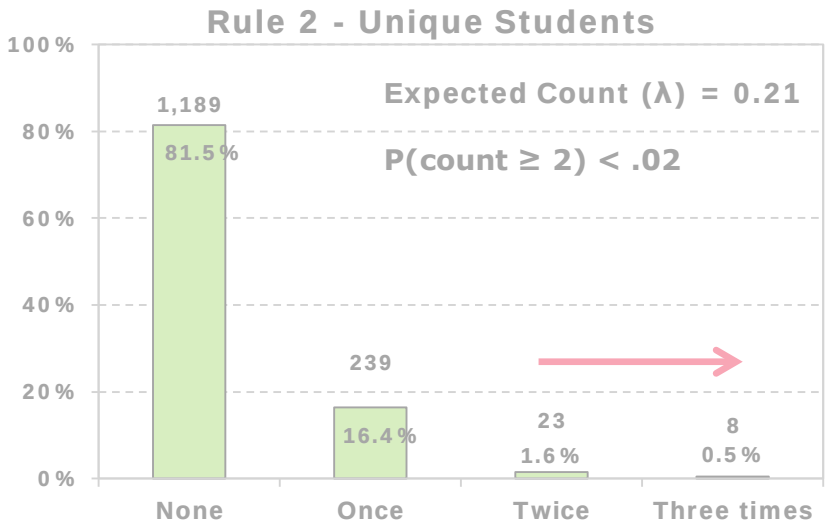

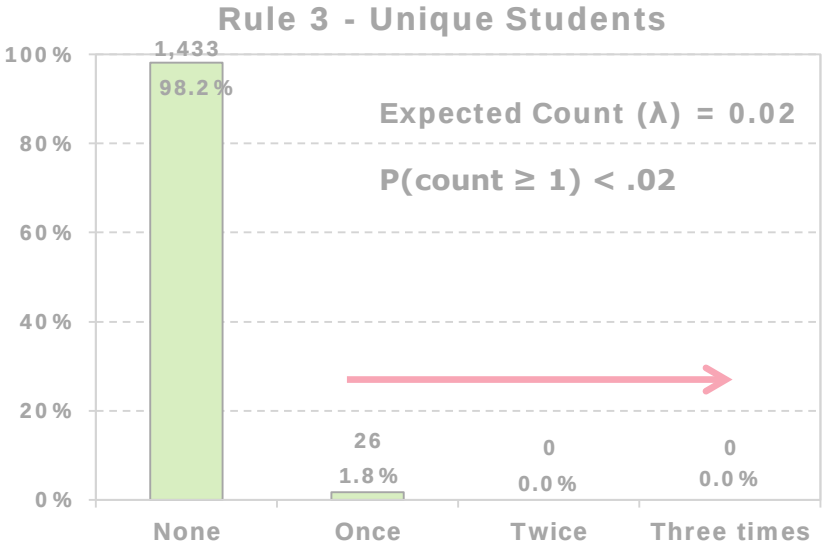

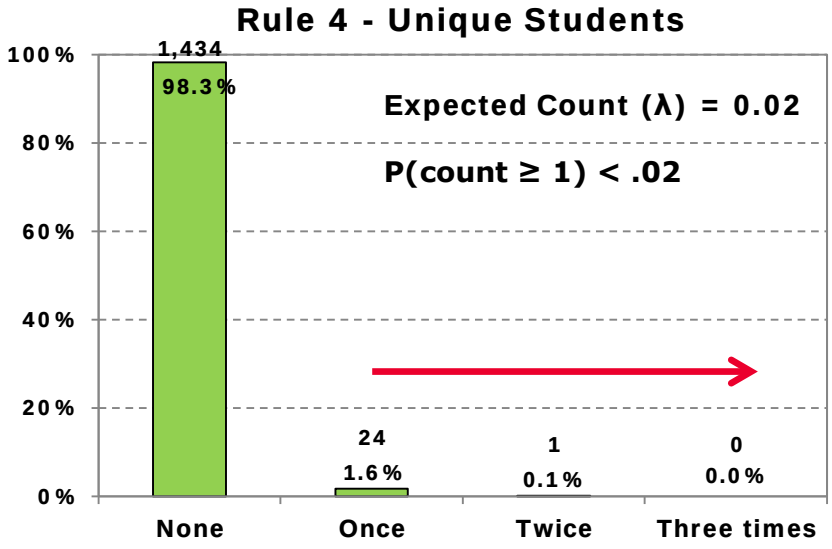

31 students with multiple violations: 2.1% of population…

Student #	Rule 1	Rule 2	Rule 3	Rule 4	# Units in sample	% unusual units
1					5	
2					4	
3					2	
4					4	
5					8	
6					3	
7					6	
8					2	
9					2	
10					4	
11					4	
12					3	
13					3	
14					2	
15					4	
16					2	
17					4	
18					3	
19					7	
20					5	
21					5	
22					2	
23					4	
24					3	
25					2	
26					4	
27					6	
28					5	
29					7	
30					4	
31					3	

Legend

- = no violations
- = 1 violation
- = 2 violations
- = 3 violations

- Prevalence study estimated 2.8% in 2014
- Repeats common within this sample across rule types
- As a proportion of units in the sample:
  - Students 3, 8, 9, 14, 16, 22, 25, & 31 had weird patterns for 100% of units
  - Students 2, 17, 23 and 27 had weird patterns for 3 out of 4 units

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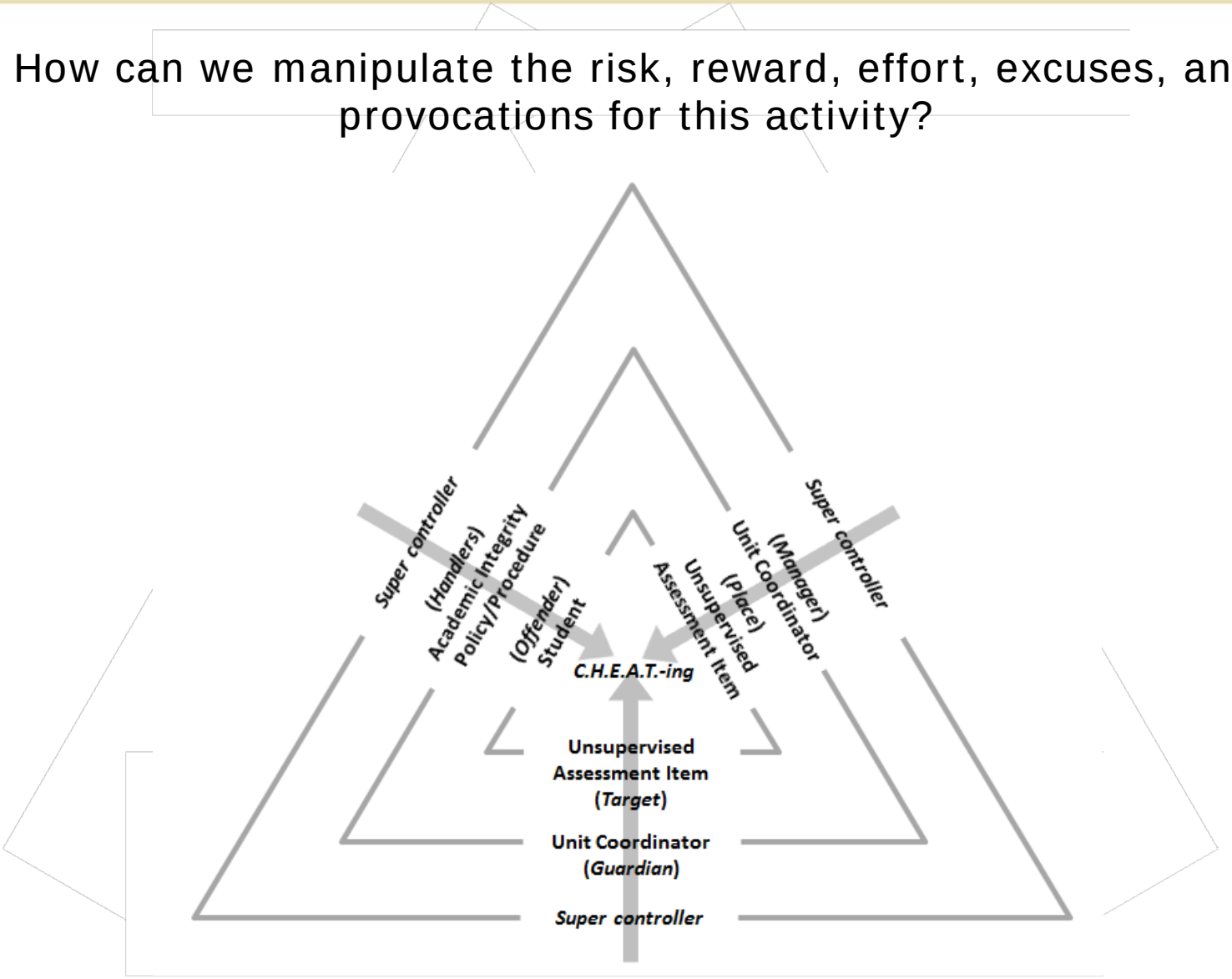
What does all of this mean?

- Just because the patterns are weird, doesn't mean the students are C.H.E.A.T.-ing
- Type 1 errors – false positives
  - Terrible at exams?
  - Potentially identified for educational support
- Type 2 errors – missing those who do just-enough on exams
  - Students can't control either mark – they can only control effort
  - Looking across Units prevents one-offs
- Can we use these types of patterns as a proxy for contract cheating?
  - Definitely a proxy for a 'problem'
  - How could we address the 'problem'?

Opportunity as a platform for targeted problem prevention

How can we manipulate the risk, reward, effort, excuses, and provocations for this activity?



Manipulating the sides and levels of the problem triangle

- Building on *what works* for crime prevention, we can do things to alter the *risk*, *reward*, and *effort* of the problem context at the
  - Student-level (motivated offender)
  - Unsupervised assessment item-level (target)
  - Unit-level (management & guardianship)
  - University-level (super controllers)

- The key to successful, sustainable responses
  - Prevention strategies that are logistically feasible (time and cost)
  - Compatible with other university policy on misconduct and assessment

- Commitment to opportunity reduction as a strategy is key
  - How this can be achieved needs to be tailored to each specific situation

Next steps

- More data
- Analysis of
  - Individual student characteristics
  - Unsupervised assessment items (in high- and low-prevalence Units)
- Trial targeted interventions in high-prevalence units
- Not dependent on apprehension
- On-going evaluation is crucial

Questions...

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