Software Tools for
Detecting Exam Plagiarism

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Is There More Cheating Online?

- Not an easy question to answer.
- Depends on
    - student population,
    - subject,
    - type of exam,
    - proctoring,
    - connection problems.

Random assignment to f2f or online final

- Elementary Statistics for Business at FDU, 2014
- Practice exam & final
- Students randomly assigned to take either f2f or online

  - On practice exam,
    - online students scored 14 points lower
  - On final exam,
    - online students scored higher

Fask, A., Englander, F. & Wang, Z. Do Online Exams Facilitate Cheating? An Experiment Designed to Separate Possible Cheating from the Effect of the Online Test Taking Environment. *J Acad Ethics* **12,** 101–112 (2014)

Online one year, proctored the next

- Macroeconomics exam at UConn
- Final exam online in 2004,
  - proctored in 2005
- Students in 2004 did better on final compared to other exams than they did in 2005.

Oskar R. Harmon & James Lambrinos (2008) Are Online Exams an Invitation to Cheat?, *The Journal of Economic Education*, 39:2, 116-125

Proctored online vs. unproctored online

- Medical Terminology for Health Professionals, Miami U.
- Unproctored average: 89.4%
- Proctored average: 74.3%
- 63% As vs. 17% As
- Unproctored was more of an advantage in competitive majors.

Alessio, H. M.; Malay, N.; Maurer, K.; Bailer, A. J.; & Rubin, B.(2017) Examining the effect of proctoring on online test scores, *Online Learning* 21 (1)
Interaction of Proctoring and Student Major on Online Test Performance, Alessio, Malay, Maurer, Bailer, and Rubin, *International Review of Research in Open and Distributed Learning*, 2018

Another take on cheating online

- Graduate Management & Leadership course, Curtin University
- MC test, 250 students
  - F2f on paper, backtracking allowed
  - Online no backtracking allowed
- No statistical difference, except on one exam where f2f students did better

Ladyshewsky, Richard K. "Post-graduate student performance in 'supervised in-class' vs.'unsupervised online'multiple choice tests: implications for cheating and test security." *Assessment & Evaluation in Higher Education* 40.7 (2015): 883-897

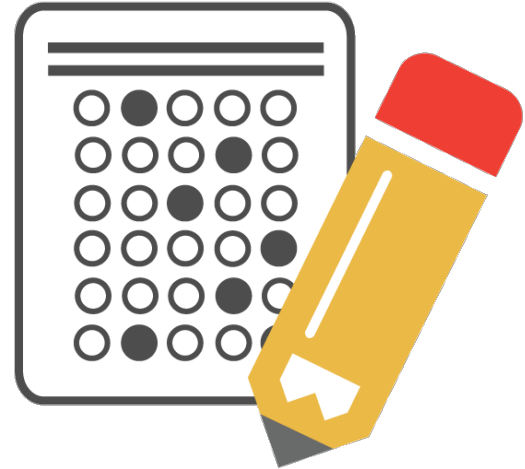# Remote Proctoring

Plagiarism Tools for Multiple-Choice Questions

1. How they detect plagiarism

2. How to use the tools

3. How to interpret the results

How Multiple-Choice Plagiarism Detection Works

- Compare two students' answers
- A C B A D D A C B A   7 same answers
- A B B B D D A D B A   of which 5 were wrong

- Of the 6 wrong answers that the first student had,
5 were shared with the second student.

- Metrics
  - How many answers were the same?
  - How many of those were wrong?
  - How many of the wrong answers were in common?
  - How frequently was each wrong answer chosen?

Three Plagiarism Tools

INTEGRITY **S-Check** **CopyDetect**

- Web app with a user-friendly interface
- Provides clear output reports which include detected pairs
- Requires a license

- Software created by George O. Wesolowsky (2000)
- Free, but time-limited
- Only contains one index
- Provides reports about detected pairs

- R package created by Cengiz Zopluoglu (2016)
- Free
- Contains more recently developed collusion indices
- No interpretation of output

INTEGRITY

Step 1: Defining the job

* - Mandatory fields.

*Job name: Midterm

*Answer key: [Choose File] keydata.txt

*Data file: [Choose File] testdata.txt

*Number of items: 65

☑ Would you like to specify **subscale** information?

Does the data file contain any of the following fields?

☑ **Writing center** ☑ **Group code**

1,3,2,1,4,4,1,3,2,1

ID Class Group   Responses

3,Class1,Male,3,1,4,3,3,2,2,4,1,4,1,2,4,2,4,2,3,1,1,3,3,3
6,Class1,Male,3,4,4,3,3,2,4,4,1,4,1,2,4,3,2,4,3,4,1,2,1,1
9,Class1,Male,3,4,4,3,3,2,3,1,4,3,1,2,1,3,4,3,2,4,1,3,3,3

Output from Plagiarism Tools

INTEGRITY

Detailed collusion detection report (all examinees)

	Examinee ID	Writing center	B-Index	PAIR1	PAIR2	MESA	g2
Pair 1	666	Class 3	High	High	High	High	High
	669	Class 3	14.772	2535.000	3900.000	1.212E-017	12.324
							12.324
Pair 2	672	Class 3	High	Moderate	High	N/A	Moderate
	675	Class 3	9.536	1170.000	1800.000		6.742
							6.742

```
Summary of Significances of Identified Pairs
------------------------------------------------

pair          Z       A Priori    Bonferroni    Approx. Prog.
                      Signif.      Signif.       Selected Signif.
------------------------------------------------------------------
9, 10        6.412    7.2E-11      1.8E-7        7.2E-11*
9, 12        5.349    4.4E-8       1.1E-4        1.1E-7
10, 12       6.412    7.2E-11      1.8E-7        7.2E-11*
18, 37       6.968    1.6E-12      4.1E-9        1.6E-12*
35, 68       4.535    2.9E-6       7.4E-3        4.9E-5
59, 71       3.919    4.4E-5       1.1E-1        2.6E-3
------------------------------------------------------------------
```

S-Check

CopyDetect

	Copier	Source	W.pvalu	GBT.pvalu	M4.pvalu	K.pvalu	K1.pvalu	K2.pvalu	S1.pvalu	S2.pvalu
76	e200477	e200372	0.009	0.026	0.012	0.098	0.001	0.015	0.02	0.256
106	e200372	e200477	0.009	0.026	0.012	0.098	0.001	0.015	0.02	0.256
92	e200120	e200420	0.027	0.032	0.037	0.273	0.237	0.304	0.183	0.35
99	e200511	e200420	0.027	0.032	0.019	0.122	0.193	0.134	0.164	0.335
56	e200049	e200266	0.894	0.954	0.962	1	1	1	0.974	0.813
80	e200103	e200406	0.898	0.897	0.929	1	1	1	0.99	0.846

NC STATE UNIVERSITY

Statistical Indices Used by Plagiarism Tools

Integrity   S-Check   CopyDetect

Statistical Distribution	Evidence of Answer Copying		
	Number of identical incorrect responses	Number of identical correct responses and incorrect responses	All items
Empirical Distribution	B (Angoff, 1972) Pair Ⅰ and Pair Ⅱ (Hanson, 1987)		
Normal Distribution		S-Check (Wesolowsky, 2000)	g_2 (Frary, 1977) ω (Wollack, 1997)
Binomial Distribution	K (Kling, 1979) K1 and K2 (Sotaridona, 2002) MESA		
Poisson Distribution	S1 (Sotaridona, 2003)	S1 (Sotaridona, 2003)	
Compound Binomial Distribution			GBT (van der Linden, 2006)

Plagiarism Tools for Essay Questions

1. Commercial software
2. LMS extension
3. Rubric-based tests
4. Cloze test

Turnitin

- An Internet-based plagiarism-detection service that compares submitted answers to several databases using a proprietary algorithm.

- Scans its own databases and also has licensing agreements with large academic proprietary databases which include internet, copyrighted pages from books, newspapers, and journals.

turnitin®

How to use Turnitin

- After logging in, click on All classes which allows you to add a new course or add new TAs or add new assignments.

- Click on the course and add the new assignment button and fill in the details

- Click "View", and it displays the similarity percentage of all the students, right beside their name.

TITLE	SIMILARITY	
Submission	0%	
Submission	6%	
Submission	43%	
Submission	58%	
Submission	80%	

Plagiarism Detection Through an LMS

- **Unicheck** is a cloud-based plagiarism-detection application that finds similarities, citations and references in texts.

- Can be integrated into an LMS (Learning Management System) via a plugin, LTI, API or LTI+API

- Works with (at least) Canvas and Moodle

- To find similarities and paraphrases, checks are performed against the Internet, open-source repositories, and users' internal libraries or databases.

Unicheck Output

'Fear me' solution is sure to be very effective too. No doubt, that some may tend to find it very influential, since fear is one of the strongest emotions, especially when it is provoked by the threat of being expelled, e.g.:

Smith, Jones, and Parks note that "you can shorten a parenthetical note by naming the author of the source in the body of the essay; then the parenthetical note consists of a page number only" (782).

In his Little Book of Plagiarism, Richard Posner, a federal judge and prolific author, shows some understanding for the frustration and even the envy that might drive talented writers to such depths. He begins the book with an epigraph from the fourth-century Roman grammarian Aelius Donatus which expresses an annoyance every writer has felt: "Perish those who said our good things before we did." Posner applies the maxim to Viswanathan's misdeeds, writing that "in an age of specialization ... a creative person is apt to have a feeling of belatedness — a feeling that though just as creative as his predecessors he has appeared on the scene too late; the ship has sailed; the niche he might have filled has been filled already." A discerning reader might detect a note of sarcasm, however, as he continues: "Oh, the unfairness, Viswanathan might have thought, of McCafferty's having picked the low-hanging 'chick-lit' fruit rather than leaving some of it for her." Posner's judicious mix of sympathy for the motive with harsh criticism of the infraction colors his book throughout.

Studies that examine links between cardiovascular and mental activity must understand that cardiovascular activity itself comprises a suite of variables (Van Roon, Mulder, Althaus, and Mulder, 2004).

Unguryan
960 pages left

SIMILARITIES   CITATIONS   REFERENCES

43% *of* **Similarities**

Sources..........80
Citations.......24%
References....7%

SOURCES FROM — INTERNET   LIBRARY

9.50%   tlt.psu.edu
http://tlt.psu.edu/plagiarism/ins...

9.24%   www.thenewatlantis.com
https://www.thenewatlantis.co...

9.24%   www.thenewatlantis.com
http://www.thenewatlantis.com...

↗ VIEW SOURCE   🗑 EXCLUDE SOURCE

5.35%   www.bates-stamp.com
https://www.bates-stamp.com/...

Rubric-Based Tests

From Gradescope, now a unit of Turnitin.

Compares rubric scores for different students, highlights similarities.

Cloze Test

- Students with suspicious submissions can be required to take this test.

- They are asked to fill in the words that have been removed from their submission

Example:

Why is education so important in our life?

Student's answer: Education gives us knowledge of the world around us and changes it into something better. It develops in us a perspective of looking at life. It helps us build opinions and have points of view on things in life. People debate over the subject of whether education is the only thing that gives knowledge.

Chase procedure:

Education gives us knowledge of the _____ around us and changes it into something _____. It develops in us a perspective of _____ at life. It helps us build opinions ___ have points of view on things in _____. People debate over the subject of ____ education is the only thing that gives _____.

- The person who has stolen the answers will not be able to do it and can be sanctioned.

SUMMARY

- Most studies report more cheating online, but it's hard to know.
- Statistical tests can warn of suspicious similarities in multiple-choice exams
- A variety of tools facilitate this, but input format may be a hurdle.
- For essay exams, plagiarism-detection software can be used, but again, input format may be a hurdle.
- Cloze tests can be employed to ferret out which students understand suspicious exam answers.
- Gradescope's rubric-based test is a promising approach.