

# Can markers detect contract cheating? Results from a pilot study.

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*Contract cheating is the purchasing of custom-made university assignments with the intention of submitting them. Websites providing contract cheating services often claim this form of cheating is undetectable, and no published research has examined this claim. This paper documents a pilot study where markers were paid to mark a mixture of real student work and contract cheating assignments, to establish their accuracy at detecting contract cheating. Seven experienced markers individually blind marked the same bundle of 20 second-year psychology assignments, which included six that were purchased from contract cheating websites. Sensitivity analyses showed markers detected contract cheating 62% of the time (95% CI: 0.46-0.76). Specificity analyses showed markers correctly identified real student work 96% of the time (95% CI: 0.89-0.99). Our results contrast with contract cheating sites' claims that contract cheating is undetectable. However, they should be taken with caution as they are from one course unit in one discipline.*

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Contract cheating typically occurs when students submit assignments they have purchased over the Internet (Lancaster and Clarke 2007). These assignments are bespoke creations, written from scratch for the student according to the specifications of the task. Many contract cheating websites claim that it is not possible to detect this new form of cheating (Lines 2016), and there is thus far no empirical evidence in the peer reviewed literature to refute that claim. Although contract cheating has been the topic of research and scholarship for more than a decade, no studies have been conducted to determine the detection rates of contract cheating.

A lack of evidence about detection rates on contract cheating means the sites' claims may be quite persuasive to would-be cheaters. If left unchecked, the global £200m contract cheating industry (Adams 2015) may lead to many students incorrectly being certified as having achieved learning outcomes. This may have disastrous consequences for public safety and community confidence

in higher education, as well as students cheating themselves out of opportunities for learning (Bertram-Gallant 2016, White 2016).

Initial approaches to addressing contract cheating focused on monitoring online auction sites where students would negotiate the purchase of these assignments in plain sight and using this information for prosecuting instances of contract cheating (Clarke and Lancaster 2007). While useful in some instances, and particularly in the infancy of contract cheating, most contract cheating sites now conduct business through confidential anonymous transactions. Unless students are quite foolish or careless, there is no public evidence trail of a contract cheating purchase.

Although contract cheating detection research has been limited, researchers have suggested approaches to deter contract cheating. Authentic, real-world tasks are often advocated for as deterrents of academic dishonesty in general; the rationale being that students might see the value in genuinely engaging with such tasks. For contract cheating there may also be a side benefit that authentic real world tasks may be challenging for essay mills to produce (Howard 2007, Carroll 2009). Broadly speaking, we share the intuition that these approaches will probably have some protective effect, however we are not aware of any empirical evidence in support of any specific approach to prevent or detect contract cheating.

Reductions in student time available to complete work have also been suggested as possible deterrents to contract cheating. By giving students less time, they have less time to arrange someone else to do their work for them (Mahmood 2009, O'Malley and Roberts 2012). However, turnaround times for contract cheating sites are already very short, as little as 24 hours (Wallace and Newton 2014), so even drastic reductions in time available to students are unlikely to stop contract cheating on take-home tasks.

The broader field of academic integrity has a long tradition of research to prevent academic dishonesty. The field is characterised by: a preference for institutional, systemic approaches; a focus on the positive (academic integrity) rather than the negative (cheating); and a preference for educative rather than punitive approaches (Bertram-Gallant 2015, Davies and Howard 2016). The positive mission of academic integrity includes approaches like having students pledge to an honour code of ethical behaviour. A number of universities in the USA adopt this practice and its success is based upon the notion that students publicly pledging to act ethically will deter them from forms of cheating. Some prior research in the USA has suggested that honour codes may deter cheating, although much of this work was conducted prior to the rise of contract cheating (McCabe 2001, McCabe, Treviño, and Butterfield 2001, Shu, Gino, and Bazerman 2011). Research conducted in a UK context (Yakovchuk, Badge, and Scott 2011) found that whilst general promotion of academic integrity was welcomed, both student and teacher participants did not support the 'moral element of the honour code system' (p. 47) and considered there were extensive logistical considerations to successfully implement honour codes in the British context (p. 47).

Academic integrity researchers also study the dispositions of students, with some suggesting administering instruments to students when they start university to measure their 'orientation towards learning versus their orientation towards grades or self-rationalisation' (Faucher and Caves 2009, p.39). This involves using a battery of personality tests to determine 'their moral stage of development' (p.39). Such an approach could be followed by educative strategies targeted at cohorts particularly vulnerable to academic integrity problems.

We support approaches like authentic assessment, the promotion of honesty, and developing an understanding of our students. However, we are concerned that research on contract cheating has thus far been largely conducted layers of abstraction away from the object of study: the purchasing and detection contract cheating assignments. This means we cannot say which approaches work to prevent or detect contract cheating, or if it is even detectable at all. At present, we are aware of only one published study involving markers marking contract cheating assignments (Lines 2016). In Lines' study, 26 assignments were purchased, and markers were asked to mark them, without being alerted to the possibility of any potential contract cheating. No markers raised concerns about contract cheating, and 23 of the assignments appeared acceptable on Turnitin. Most of the assignments received a passing grade, and some scored high grades. Lines' study has troubling implications, however it represents one discipline, history, and markers who were not specifically instructed to detect contract cheating. While it is useful to know that markers might not detect contract cheating when they are not asked to, we believe it is also useful to know if markers can detect contract cheating if they are specifically asked to do so.

This paper addresses the lack of evidence around contract cheating detection rates through a pilot study involving real student work and real contract cheating assignments. In particular, it addresses the question: "How well can markers detect contract cheating?"

## Method

In this study, seven markers were each provided with 20 assignments, which consisted of 10 'Assessment Task 1s' and 10 'Assessment Task 2s' from a second-year psychology unit. For both assessment tasks, three assignments were purchased from contract cheating websites, and seven were provided voluntarily by students. One limitation of this approach is that we cannot be sure the student-provided work was not itself contract cheated. The student assignments provided were all from the preceding assessment period, so were not 'live'; students were assured their grades would not change and they would not be accused of cheating as a result of the study. All markers were provided with a copy of the same set of assignments, which had been carefully anonymised to ensure no identifying student information was present. Assignments were presented in random order.

The unit content focuses on several aspects of child development, with developmental phases from infancy to adolescence. The unit is core to all psychology undergraduate degrees at our institution and is undertaken by cohorts ranging from 800-1000 students in each trimester (offered 3 times each year). Students from other disciplines such as education and nursing also enrol in this unit as an elective.

Assessment Task 1s required students to write a 'skeleton' policy brief on a real-world issue that poses major risks for child development, plus a personal reflection, worth 20% in total. Assessment Task 2s required students to write a 'major' policy brief on a different topic, worth 40%. The remainder of the unit's assessment weighting came from two-hour final exam, which was not considered in this study.

Contract cheating assignments were purchased by a research assistant using PayPal. In the purchase process the sites were provided with the same assignment specification details the students were given by their teachers. This included instructions and marking criteria.

The teaching staff involved in this unit were not members of the research team, and they assisted in the recruitment of marker and student participants. All participating markers had previously marked assessment in the unit for at least one semester. Participating markers were paid at the usual marking rate for their time. In addition to marking the assignments and allocating a grade, markers were also required to make a judgement as to whether each assignment was an instance of contract cheating. If they thought a particular assignment was contract cheating, they were asked to justify their decision in writing. We recognise that by informing markers that this was a study of contract cheating we may have primed them to be more attuned to contract cheating. However we regarded this as necessary to improve detection accuracy, as Lines' (2016) study already demonstrated a zero detection rate for markers who were not specifically looking for contract cheating. We also regard this as a reasonably authentic feature of our research study, as any attempt to improve contract cheating detection would be likely to ask markers to attempt to detect contract cheating.

This study was approved by the relevant ethics committee (approval number HEAG-H 136:2016) as low risk research. We recognise there are a range of ethical issues inherent in the purchase of contract cheating assignments. We consulted relevant institutional, national and society guidelines (American Educational Research Association 2011, Hammersley and Traianou 2012, National Health and Medical Research Council, Australian Research Council, and Australian Vice-Chancellors' Committee 2015) and we discussed these issues with our peers in academic integrity and parallel fields like forensic pharmacology. Most prominently, we discussed the provision of financial support to an industry that provides cheating services to students. While we would have preferred not to fund the contract cheating industry at all, our purchases totalled only \$AU1,024 (equivalent to £630), equivalent to 0.0003% of the estimated contract cheating industry turnover of £200m (Adams 2015). We,

and our ethics committee, agreed that the potential benefits of this sort of work justified this risk.

## Results

In total, 140 instances of marking occurred, including 98 marking instances of real student work (7 markers marking 14 assignments) and 42 marking instances of purchased assignments (7 markers marking 6 assignments). Two of these assignments (one for each task) were 'premium' contract cheating assignments, which were more expensive and supposedly of higher quality and written by more qualified writers. Table 1 provides a breakdown of each assignment and the judgements made by markers about contract cheating. We have used the abbreviation CC to represent contract cheating.

<b>Task</b>	<b>Number</b>	<b>Real or CC</b>	<b>Number of markers who flagged CC</b>	<b>Percentage of markers who were correct</b>
Assessment Task 1: 'Skeleton policy brief'	Student 1	Real	0	100
	Student 2	CC	4	57
	Student 3	Real	0	100
	Student 4	CC	2	29
	Student 5	Real	0	100
	Student 6	Real	0	100
	Student 7	CC (Premium)	6	86
	Student 8	Real	0	100
	Student 9	Real	0	100
	Student 10	Real	1	86
Assessment Task 2: 'Major policy brief'	Student 11	Real	0	100
	Student 12	CC (Premium)	3	43
	Student 13	Real	0	100
	Student 14	CC	4	57
	Student 15	Real	0	100

Student 16	Real	0	100
Student 17	Real	1	86
Student 18	Real	2	71
Student 19	Real	0	100
Student 20	CC	5	71

Table 1. Marker detection results per assignment. CC=Contract Cheating.

Using the data in Table 1 it is possible to calculate the sensitivity and specificity of marking as a means of detecting contract cheating. Both measures are important here, as we wanted to determine marker accuracy at detecting contract cheating (sensitivity) as well as their accuracy at detecting real student work (specificity). Our markers' average sensitivity was 62% (95% CI: 0.46–0.76; confidence intervals in this paper use the efficient-score method, corrected for continuity, per Newcombe 1998). This means that 62% of the time, when a marker was looking at an assignment that was purchased, they correctly identified it as contract cheating. Our markers' average specificity was 96% (95% CI: 0.89–0.99). This means that 96% of the time markers accurately identified real student work and did not flag it as contract cheating.

There was reasonable variation between markers in terms of their sensitivity and specificity. Table 2 provides a summary of each marker's accuracy.

<b>Marker</b>	<b>Sensitivity</b>	<b>Specificity</b>
Marker 1	3/6 = 50%	14/14 = 100%
Marker 2	4/6 = 67%	12/14 = 86%
Marker 3	4/6 = 67%	14/14 = 100%
Marker 4	3/6 = 50%	13/14 = 93%
Marker 5	6/6 = 100%	14/14 = 100%
Marker 6	3/6 = 50%	13/14 = 93%
Marker 7	3/6 = 50%	14/14 = 100%

Table 2. Sensitivity (true positive rate) and specificity (true negative rate) per marker.

Sensitivity ranged from 50% through to 100%, and specificity ranged from 86% to 100%. Our best marker made no mistakes, whereas the worst (assuming a false positive is worse than a false negative) had sensitivity of 67% and specificity of 86%.

Markers were also required to provide a brief justification for their decisions. An example justification from Marker 5 (the marker who made no mistakes) is:

“The assignment is not set out in sections (some are not included at all), it presents as a generic essay on obesity. No table included, info included is irrelevant to assignment at times. Main focus is on lack of physical exercise rather than conceptualising the problem in terms of social development, identity formation theory etc. Relies heavily on one reference, reflection section left out.”

Two researchers conducted an inductive thematic analysis on the reasons given by markers when they correctly identified contract cheating. These reasons were identified from the data and were not provided to the markers before they marked. Table 3 lists the most common reasons, and the number of times each was used.

<b>Reason CC was suspected</b>	<b>Times used when CC was correctly identified</b>
Did not address key questions	9
Poor structure (usually essay)	8
Missing sections (tables, figures, reflection)	8
Lack of psychological theory, or poor conceptualisation	7

Table 3. Most common reasons markers gave to justify a correct decision for contract cheating.

The most common justification was that an assignment simply did not address the questions asked by the task; this led one marker to comment “it is like the student has copied an essay linking pain and children” rather than specifically writing responses addressing the task.

When markers commented on the structure of the task, they usually stated that it appeared the student had not followed the task instructions. To the markers, several of the contract cheating assignments appeared more like essays rather than the specific policy brief tasks students were required to produce. One marker noted an “abundance of definitions and statistics, formal writing style, flow does not seem to be related to the assignment topic, has not followed the assignment guide (absence of figures in suggested sections)”.

Missing sections also alerted markers to potential contract cheating. The most common missing section was a reflective component, which was completely omitted by some contract cheating sites. To our experienced markers this was quite unusual as reflections have been part of the curriculum in psychology, as in education and nursing at our university, for some years. It would be most unusual that a student was unfamiliar with what is required in reflective work or

had not completed at least one reflective task for assessment in their first year of psychology.

Although the contract cheating services were asked to produce an assignment in response to a psychology assessment task, our markers often commented that the product lacked psychological theory or adequate conceptualisation. Contract cheating assignments often appeared to take a medical approach to the task, rather than a psychological approach. For example, one marker commented, “No reference to [important theory covered in the unit] or social development as per assignment instructions – most students at least attempt this and certainly students who can write at this level would include at least cursory mention of key theoretical concepts”.

## Discussion and conclusion

This is the first study we are aware of to quantify how accurate markers are when asked to detect contract cheating. Prior to conducting this study we did not know if the markers would replicate Lines’ (2016) zero detection rate, or if they would just be guessing. These results should provide some optimism to educators and policymakers that in at least some circumstances it is possible to detect contract cheating at the time of marking.

The results presented in this paper are from two tasks, in one course, in one language, in one country, in one discipline, with seven markers and a small set of assignments. While the detection rates are substantially better than random chance, this does not mean they are generalisable beyond this context. Further work needs to be done with a range of task types in a range of disciplines and levels of study to establish reasonable baseline detection rates. It is entirely possible that our markers were particularly skilled; our contract cheating sites were particularly inept; the tasks were particularly well designed; or that some other feature of our context produced these results.

Rather than just report sensitivity and specificity rates as single numbers, we have also reported confidence intervals. For our study, confidence intervals show the potential range of the ‘true’ sensitivity and specificity rates, in recognition that our figures are likely somewhat influenced by random chance. This is commonly done in medical research when sensitivity and specificity are outcome measures from diagnostic tests. The confidence intervals reported in this paper have practical relevance. The CI for sensitivity is promising, as even a detection rate as low as 46% (the lower bound of the confidence interval for sensitivity) has the potential for a significant deterrent effect. It would be unlikely that many students would attempt this type of cheating if they thought there was an even a 46% chance of getting caught, particularly as the penalty for contract cheating is expulsion at many institutions (Tennant and Duggan 2010, Sutherland-Smith 2014, Quality Assurance Agency 2016). However, the CI for specificity is somewhat troubling. At the lower bound, the true specificity rate of marker detection may be less than 90%. This presents significant practical difficulties for the use of marker detection of contract cheating, as anywhere up to 11% of real student assignments may be incorrectly flagged as being



purchased. Further work with larger sample sizes is required to better understand where the true detection rates lie.

We are aware that the sample size used in this study may appear small, and while we would have liked to have conducted a statistically powered study, we faced two barriers. Firstly there is no baseline data on detection rates of contract cheating, which is necessary to conduct sample size calculations. Secondly we faced budgetary and logistical constraints that meant we were limited in terms of the sample size we were able to obtain. In the field of medicine, where sensitivity and specificity analyses are important measures of new tests, it is common to conduct and publish a pilot study like ours to gather and share baseline data for sample size calculation. This then enables the writing of funding applications to conduct an appropriately powered study. This paper contains the necessary data for future researchers to conduct a statistically powered study, with the caveat that there may be differences with different assignments, student populations, disciplines and so on.

Beyond statistically powered and more diverse samples, future work should also focus on approaches to improve detection rates, including training of markers in contract cheating detection strategies, or approaches to prevent contract cheating entirely. This paper demonstrates that it is possible to evaluate the sensitivity and specificity of detection of contract cheating; further work should statistically compare different assessment approaches with respect to these tests.

There are some limitations or difficulties to overcome in conducting research into contract cheating. Gaining student consent to use their assignments to compare against contract cheated work may make obtaining large samples difficult or costly. Students may not wish to provide their work for this sort of research, possibly for fear of being labelled a cheater. We believe it is important to obtain genuine student work in order to measure both sensitivity and specificity of marker accuracy in detecting contract cheated work as distinct from real student work. However, a potential weakness of this research design is that we may never be completely sure that the student-provided work is legitimate; studies of this type may themselves be vulnerable to contract cheating.

A further challenge in some institutions may be a reluctance of ethics committees to allow the purchase of contract cheated assignments, particularly in countries like New Zealand where the supply of contract cheating services is illegal (Newton and Lang 2016). However we believe that to truly understand the detection and prevention of contract cheating it is necessary to conduct research with real contract cheating assignments. National regulatory bodies in some contexts, such as the Australian Tertiary Education and Quality Standards Agency (TEQSA), require institutions to take reasonable measures to promote academic honesty and prevent academic dishonesty, including contract cheating (Tertiary Education Quality and Standards Agency 2015). We think universities need to hold themselves to the highest levels of empirical evidence when addressing matters as destructive as contract cheating.

Marker justifications for their decisions about contract cheating indicate that discipline knowledge and experience marking the same task may support detection. Indeed, when one researcher on the project (PD) who is from outside the discipline of psychology attempted to do the same task as the marker participants, his accuracy was little better than random chance. Markers were concerned with sophisticated application of theory that they understood, and disciplinary boundaries around the nature of psychology. We suspect that if these markers were to attempt to detect contract cheating in another discipline that their accuracy would be significantly lessened. While we do not wish to generalise beyond our study context, we would encourage institutions wishing to address contract cheating to consider the benefits of expertise and experience when employing markers, who are often employed on a short-term or casual basis and not provided with training.

An important caveat for this paper is that detection of contract cheating is not the same as successful prosecution of contract cheating. We do not suggest that marker hunches should be used to judge students. Despite being mostly accurate when they thought contract cheating had occurred, markers were not in a position to provide the level of evidence for their judgements that would be required for many formal academic hearing processes. Unless students or contract cheating sites make a significant mistake, or are the subject of detailed, intensive investigations, proving contract cheating to the extent required in formal university processes is very difficult. However, we do think that in circumstances where there is concern about contract cheating at the point of marking, that alternative assessment should be considered. This could take the form of an invigilated assessment of the same outcomes, or perhaps a viva. As with any assessment design, factors like class size, workload and logistics would need to be balanced against core concerns of academic integrity, learning and validity for these alternative assessments (Bearman et al. 2016).

The most significant outcome of this study is that it contrasts with the claim that contract cheating is completely undetectable. We have shown that, in some circumstances, markers are able to spot contract cheating most of the time. We hope this result concerns contract cheating services, however we do not expect it will change any of their guarantees about being impossible to detect. These sites make many promises, such as guaranteed grades and money-back guarantees (Lines, 2016), however when students have attempted to use these guarantees there have been reports of blackmail, in the form of threats to reveal the identity of the cheating student (Lancaster 2016). However we do hope this result may dissuade potential cheating students, because if their markers are looking for contract cheating, they may very well find it and the consequences can be severe.

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