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The Effects of Intrusive Proctoring

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The purpose of this study is to look for any way that proctoring styles may affect test results. This is essential as test taking contributes greatly in the academic careers of students. If test results are not reflecting the true knowledge of students, there is a discrepancy that must be addressed. This study will use timed problems under two proctoring conditions. The two levels being measured are intrusive proctor behaviors and non-intrusive proctor behaviors. The results of this study show that there were no significant differences between test scores of intrusive proctoring (M = 42.1111, SD = 4.05) versus non-intrusive proctoring (M = 42.5556, SD = 11.28). Even though results were not significant, there is still a discrepancy between the between tests scores. Therefore, despite the data that is not in support of the original hypothesis, that tests intrusively proctored will result in lower test scores, the data still calls for additional research on this subject.

Test taking can evoke a great deal of anxiety for some test takers. Additionally, the environment that a test takes place is also a large factor onto how the results of a test will come out. Upon reviewing an article by Romanowski (2008), there is an issue with students and the frequency of cheating and academic dishonesty. In 2002, when college students were asked if they had cheated during their academic career, 74% of all students admitted that they had cheated in high school. Cheating is viewed as common and therefore is not always seen as detrimental to education. While proctors are essential in test taking to ensure the academic honesty of students, Romanowski (2008) suggests that there are other ways to ensure that

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cheating does not occur. Romanowski (2008) focuses on the idea that education has become solely grade based which removes the concept that education is for knowledge expansion. While his suggestion of focusing assignments on more original ideas versus standardized tests seems helpful, it is difficult to measure the full understanding of a concept by using this method. Romanowski (2008) also mentions that of the students who admitted to cheating in high school, the number of students who clarified that they had not been caught cheating was as high as 92%. The response to this was for educators to act more harshly when in reference to cheating. As in, create tougher punishments for students who are found cheating or create a way to look for cheating that is outside of the normal type of test-taking (Romanowski, 2008).

The importance of more intrusive or actively proctoring is demonstrated in the Romanowski (2008) article, by showing the prevalence of cheating among students; however, there are still negative effects of intrusive proctoring on the achievement of students. Intrusive proctoring can be both disruptive and uncomfortable. In an experiment completed by Wong and Brown (1920), the researchers tested the effect of environment on efficiency of work. During the experiment, participants were either placed in a “bad” room or a “good” room. The “bad” room was operationally defined as the room with less light in comparison with the “good” room. This room was also disorganized and was filled with multiple random objects that could be a distraction to the participants. The “good” room was identified as the room that had better lighting and was much more organized in comparison to the opposite room. During this study,

the participants were tested on how well they were able to solve a problem. While the results of this study showed to be slightly inconsistent as a result of participant differences, overall there were averages that showed participants in the "good" condition performed better than those placed in the "bad" condition (Wong & Brown, 1920).

Super, Braasch, and Shay (1947) assessed the ways that distractions can have an effect on test performance. These researchers examined if "normal" distractions would have a significant effect on test scores. This study focused on graduate students and used a distracted group and a control group. The researchers created specific times for the distractions to occur as a constant variable in their study. Some of the distractions were, for example, a pencil breaking and a timer going off at the wrong time. The experimenters tested for statistically significant differences in test performance based on participants' age and sex and those results showed that there were none. While the distractions of this study did not produce any significant differences in test results, there were group differences among those tested. It is also important to note that the experimenters write, "None of the distractions went unnoticed during the test period" (Super et al., 1947, pg. 375). While no significant results were reported from these researchers, it is important to acknowledge even small differences among test scores when in different environments, as it could be detrimental to some test takers (Super et al. 1947).

There are currently many tests, used for various reasons, that have adopted the idea of online testing as a way to still proctor tests in a remote way. The main concern for online tests is

the likelihood that test takers will end up cheating. However, benefits also arise from online testing. Some of these benefits include cost savings in the administering of tests, time savings for proctors, and it gives flexibility for test takers in when and where they will decide to take their test. A design conducted by Karim, Kaminsky, and Behred (2014), researchers tested online proctored tests. The results of Karim et al. (2014)'s study showed that the participants who were being proctored also reported privacy and pressure concerns. This may have to do with the idea that they were watched over video. The work of these researchers also show that more participants in the proctored condition withdrew from the test over the participants placed in the non-proctored condition. While the nervousness due to proctored testing was heightened, there was only a small effect that showed proctored tests produced less cheating (Karim et al., 2014). Additionally, this study also did not show any evidence that personal differences had an effect on the results of the study. Knowing the information provided by Karim et al. (2014), there must be a medium standpoint that can be adapted for test takers between proctoring and making sure that test takers are in a setting that does not increase test anxiety. One way that the researchers suggest a medium, is verifying that the test taker is independently taking a test through only a selection of video and then continuing the test unmonitored. One problem arises here and it is that after the initial verification, a test taker may not be completing the test alone (Karim et al., 2014). In the study that I proposed, my concept was to be non-invasive and only monitor a participant by turning around to check that they are not using any other resources and then

continue to let them work independently. Similarly, if Karim et al. (2014) extended the research they had done, that could be a possibility for changing the idea that the participant may use other sources later in the test by incorporating ways to make sure participants are not using other sources without being invasive.

In another remote type of testing, Kantrowitz and Dainis (2014), used employment tests to research the frequency of cheating on those particular types of tests. In order to test their hypothesis, that unproctored online tests increase cheating, Kantrowitz and Dainis (2014) found a company that was hiring and used the hiring data to observe cheating frequencies. Those applying for the job, and therefore submitting their data to this study, did both online employment testing and in person employment testing. Data for both of these was used in the study; however, only in person tests were used in the hiring process for these prospective employees. The results of Kantrowitz and Dainis (2014) were inconsistent. However, out of all 4,026 participants, 259 were shown to exhibit statistical significance for cheating (Kantrowitz & Dainis, 2014). While this showed results that exhibit cheating, more participants did not exhibit cheating behaviors. Additionally, the significance of the cheating can still be caused by outside factors in the study like nervousness or illness; therefore, not concluding that remote proctoring results in higher frequencies of cheating (Kantrowitz & Dainis, 2014).

Another reason that I believe that intrusive proctoring can be a detriment on test results is the idea that when a test-taker is being watched, he or she will not give full attention to the task

which is currently being dealt with. In a study completed by Belletier et al. (2015), the researchers evaluated the concept of "choking". The researchers define this as "Performing more poorly given one's skill level ("choking")… especially when one's performance is being evaluated" (Belletier et al., 2015, pg. 1410). Belletier et al. (2015) used three separate conditions that participants were randomly assigned to. The participants were either alone, placed with a confederate, or in the experimenter condition. The measurement taken involved a task where the participants were measured on how quickly they responded to a stimulus. Additionally, each participant had prior training in the task at hand. The results of this study show that there were no differences between the control condition, the condition where the participant was alone and the condition where the participant was with an experimenter both showed significant data. However, the condition where the participant was placed in a room with a confederate, there were no significant findings (Belletier et al., 2015). Similarly, in the study that I conducted, I was particularly looking for the effects that my presence while watching a participant may have.

While not directly related, it is important to look at the ways in which test-takers' perception of proctors can alter test results. For example, if a test-taker feels more comfortable around a certain type of proctor, there may be a relationship with a test score. This may have something to do with test-taking environment and the ways that it can impact results. Vormittag, Ortner, and Koch (2015) surveyed test takers on their proctor preferences. These participants viewed four video clips total with two male and two female administers. Following the viewing

of clips, each participant chose a preferred examiner in the event that they would be test taking. The results of this study turned out that 66.13% of the participants preferred female proctors and 33.87% of participants preferred male proctors (Vormittag et al., 2015). One main reason why test takers preferred female proctors was that they were viewed as more warm versus cold. This is important to note when looking at test taking environment and the variables that go in to making test takers feel comfortable. In the discussion section of this scholarly article, the authors make note that there are preferences among types of proctors; however, they did not test to see if preferences have an effect on test results. They reference that future research should test for this type of test result effect (Vormittag, 2015).

Reviewing literature has led me to question the effectiveness of less intrusive proctoring in association with knowledge and memory on tests. Even though research does not always give significant support to the effects of test environment, it is still important to pay attention to the small populations affected by these types of concepts (i.e. choking and test anxiety). By using two separate proctoring styles, I attempted to test the hypothesis that intrusive proctoring will produce lower test scores than non-intrusive proctoring. To complete this task, I administered short tests in a within-subjects design to see if proctoring styles had an effect on test results. Upon conducting this study, I hoped to support the idea that test environment plays a role on test achievement and to come up with solutions on how to make test taking a more comfortable environment.

Method

Participants

Throughout the entirety of this experiment, there was a total of nine participants. The age of the participants ranged from 18 to 22 with the mode of the participants ages being 19.5. Out of all the participants one identified themselves as male participants and eight identified themselves as female participants. While given the option, no participants identified themselves as other. The two most common majors of all participants were exercise science and public health. The academic standing of a majority of the participants was of sophomore (M = 2, SD = .86603) standing (see Figure 1 for demographics regarding all participants). All of the participants were recruited through the Lindenwood Participant Pool at Lindenwood University. The participants through the Lindenwood Participant Pool are able to participate in studies in order to earn extra credit through their allowed general education courses.

Materials

In order to conduct this study, I used various materials such as the testing materials, surveys, and paperwork needed in order to conduct ethical research. The first material would be the informed consent. This is the form I had two copies of and made sure was filled out before beginning the study. Another material that was incorporated into this study was the demographic survey (see Appendix A). The demographic survey questioned the participants on a variety of information regarding their demographics. The survey that I wrote was done in person and on

paper. Each participant filled out the paper survey during his or her appointment time. The next material used in the process of this experiment was the two sets of addition problems. Each set consisted of 200 addition problems, which were set up through an online generator (see Appendix B) The online generator used in order to set up these sets can be found at http://www.softschools.com/math/worksheets/addition_worksheets.jsp. The addition problems were each of three-digits and under. The last material I handled in addition to the experimental materials was the feedback letter given to each participant (see Appendix C). This feedback letter informed the participant what I was in search of during my study and gave them my contact information in the event that they had any questions.

Along with the materials used in the experimental process, I also used a variety of materials in order to recruit participants. I used the website Sona Systems to set up my study and recruit the participants. Through here I was able to post numerous timeslots so that participants could sign up and be part of the experiment.

In addition to the required materials for setting up a study through Sona Systems and recruiting through the LPP, there are also required documents through the Lindenwood Participant Pool that were needed to give credit to the participants. These documents included the participant receipt and the participant sign-in sheet. After the completion of the experiment and the collection of the data, I used IBM SPSS Statistics 23 to conduct the analysis for the results of this study.

Procedure

After having my study approved by both the PPSRC and the IRB at Lindenwood University, I was allowed to conduct research. Following my submission of all necessary documents to the Lindenwood Participant Pool office, I set up my study on Sona Systems. The necessary documents included IRB Approval Code, IRB Expiration Date, and multiple Room Booking Requests. Since the goal of the study was to imitate a real-life test taking experience, I requested a room that was more similar to a classroom versus a room with just one seat in it. I conducted each study in the Psychology Research Lab at Lindenwood University. More specifically, I ran each participant in the largest lab, Aronson.

As the participants entered the room, I asked them fill out each of the LPP forms correctly. These forms were the Participant Sign-In Sheet and the Participant Receipt. I explained to the participants that in order to receive credit for the study that they must turn in the participant receipt by Friday before the LPP Office closes. The next step was to have the participants sign two copies of an informed consent. The first copy was for them to keep and the second copy was for my record. I then explained to the participants that they would start the study with a survey. I verbally informed them that they were free to resign or skip any questions on either the survey or the addition problems with no penalty and that they would still receive full credit through the LPP whether they decided to complete the study or not.

I began the study with distributing the demographic survey. Following the completion of the demographic survey I gave the participants the instructions for the experiment. I told the participants that they would be timed for 5 min on each set of addition problems and that I would instruct them when it was time to stop. I made sure to mention that the addition problems were to be completed by hand and without a calculator. I then asked the participants if there were any questions or confusion. Following the clarification of any questions, I distributed the first set of addition problems. The first set was different for each participant as I used counterbalancing for this experiment. In order to counterbalance, I switched the position of the intrusive proctoring and the less intrusive proctoring with the set A and set B of addition problems. For the intrusive proctoring, I walked around the participant. I had also kept my movements consistent throughout the whole research process. I scheduled specific times for the intrusive proctoring that I could be walking so that it would be the same for each participant. My goal was to be slightly disruptive to the environment of the participant. The less intrusive proctoring consisted of me sitting in a chair somewhere far from the participant. During the less intrusive proctoring, I tried to remain as quiet as possible while still turning to look at the participants to make sure they were not using a calculator or another person to answer the addition problems.

Upon the completion of the experimental process, I thanked each participant for helping me in my study. I made sure to debrief each participant. To do this, I explained that the actual purpose of my study was to see the difference in test scores with different types of proctoring. I

told the participants that if they had any questions or were interested in knowing the results of my study that my contact information was left on the feedback letter. I then reminded each participant that he or she must submit his or her participant receipt to the Lindenwood Participant Pool office.

Results

After conducting a Paired Samples t-Test, SPSS calculated that Intrusive Proctoring (M = 42.1111, SD = 4.05) did not produce significantly lower scores than Non-intrusive Proctoring (M = 42.5556, SD = 11.28), $t(8) = -.066$, $p = .4745$ (See Figure 2 for statistical analysis). No other statistics were conducted in this study other than descriptive statistics for the participant demographics and testing to see if there were any significant differences in the two tests I had administered. The Paired Samples t-Test also gives no statistical significance between the two tests, A and B (See Figure 3). In my study, I asked each participant about his or her math difficulty and his or her enjoyment of math. According to the 5-point Likert scale, participants rated their math ability a 3.3 and rated their math enjoyment a 2.2 out of 5 total.

Discussion

Further research on this subject is necessary. There has not been much research done which solely focuses on proctoring styles and test achievement. In furthering my own research, I think it would be wise to additionally produce my own survey which asks about the occurrence of cheating on tests. I would want to focus less on plagiarism and assignments and rather I would want to specifically ask about frequency of cheating on tests. I may include questions about test anxiety and figure out how test takers prefer their environment. I would then try to implement that particular environment as an independent future research study. With my study, I had a low participant count. This causes problems when looking for significant test results. In the future, I will implement skills to try and recruit more participants.

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Figure 1

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
VAR00001	9	18.00	22.00	19.5556	1.13039
Valid N (listwise)	9				

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
VAR00001	9	1.00	4.00	2.0000	.86603
Valid N (listwise)	9				

Figure 2

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Intrusive	42.1111	9	12.14953	4.04984
	Nonintrusive	42.5556	9	11.28175	3.76058

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Intrusive & Nonintrusive	9	-.474	.198

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Intrusive - Nonintrusive	-.44444	20.11909	6.70636	-15.90935	15.02046	-.066	8	.949

Figure 3

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	A	43.6667	9	12.16553	4.05518
	B	41.0000	9	11.09054	3.69685

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	A & B	9	-.537	.136

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	A - B	2.66667	20.39608	6.79869	-13.01115	18.34448	.392	8	.705

Appendix A

1. What is your major? (if you have more than one, list both)

   _____

2. How many credit hours are you taking this semester? _____

3. What is your academic standing?

   - Freshman
   - Sophomore
   - Junior
   - Senior
   - Other

4. What is your age?

5. How would you identify yourself?

   - Male
   - Female
   - Other _____

6. On a scale of 1 to 5, how would you rate your difficulty doing math problems?

   1 2 3 4 5

   Least Difficult Most difficult

7. On a scale of 1 to 5, how would you rate your enjoyment while doing math problems?

1	2	3	4	5
Do not enjoy ☹				Enjoy ☺

Appendix B

Set A

298	209	328	383	12	195	623	271
+31	+913	+571	+291	+338	+41	+805	+301
___	___	___	___	___	___	___	___
282	796	800	995	684	356	851	358
+491	+15	+363	+361	+963	+526	+469	+966
___	___	___	___	___	___	___	___
212	80	230	670	992	95	120	4
+588	+257	+602	+690	+856	+2	+723	+21
___	___	___	___	___	___	___	___
46	798	810	203	540	742	222	504
+355	+559	+603	+561	+62	+406	+573	+244
___	___	___	___	___	___	___	___
173	524	903	891	658	446	29	543
+445	+433	+279	+466	+584	+253	+276	+267
___	___	___	___	___	___	___	___
443	902	213	988	125	762	179	825
+761	+855	+546	+962	+229	+626	+264	+866
___	___	___	___	___	___	___	___
211	215	600	128	164	827	646	902
+130	+1	+403	+9	+741	+279	+3	+981
___	___	___	___	___	___	___	___
906	791	45	194	205	613	716	723
+536	+345	+190	+304	+747	+356	+277	+979
___	___	___	___	___	___	___	___
616	728	257	155	918	763	856	372
+396	+621	+522	+95	+998	+223	+393	+653
___	___	___	___	___	___	___	___

194 +392 ___	466 +144 ___	419 +396 ___	352 +990 ___	17 +412 ___	509 +906 ___	966 +820 ___	528 +458 ___
381 +351 ___	679 +6 ___	590 +974 ___	740 +248 ___	331 +420 ___	174 +657 ___	543 +743 ___	126 +493 ___
451 +677 ___	6 +619 ___	239 +547 ___	597 +67 ___	645 +108 ___	751 +117 ___	226 +50 ___	724 +707 ___
877 +836 ___	113 +136 ___	433 +168 ___	179 +352 ___	813 +662 ___	72 +603 ___	240 +247 ___	79 +860 ___
514 +385 ___	581 +225 ___	167 +463 ___	840 +475 ___	637 +618 ___	53 +7 ___	239 +791 ___	430 +710 ___
798 +58 ___	139 +713 ___	332 +121 ___	100 +522 ___	21 +405 ___	520 +801 ___	33 +354 ___	988 +941 ___
473 +403 ___	714 +587 ___	839 +557 ___	184 +529 ___	884 +696 ___	122 +668 ___	722 +512 ___	134 +334 ___
335 +465 ___	822 +868 ___	380 +247 ___	500 +210 ___	355 +53 ___	824 +232 ___	713 +360 ___	818 +672 ___
485 +24 ___	793 +833 ___	332 +249 ___	593 +662 ___	733 +381 ___	478 +412 ___	143 +550 ___	675 +882 ___

619	318	314	41	708	985	182	339
+882	+120	+389	+575	+674	+886	+259	+920
___	___	___	___	___	___	___	___
824	837	879	814	366	529	749	471
+698	+177	+628	+413	+568	+165	+581	+891
___	___	___	___	___	___	___	___
995	636	209	673	425	264	787	302
+398	+672	+592	+288	+320	+249	+130	+763
___	___	___	___	___	___	___	___
380	564	874	438	71	278	990	185
+963	+896	+395	+678	+63	+194	+232	+130
___	___	___	___	___	___	___	___
333	538	187	444	856	634	522	980
+894	+108	+343	+683	+932	+39	+577	+298
___	___	___	___	___	___	___	___
299	986	869	60	528	368	956	339
+630	+803	+945	+950	+318	+884	+980	+910
___	___	___	___	___	___	___	___
459	688	707	919	261	866	287	751
+513	+534	+367	+872	+144	+558	+958	+414
___	___	___	___	___	___	___	___

Set B

34 +1000 ____	639 +982 ____	535 +579 ____	267 +319 ____	624 +972 ____	998 +65 ____	326 +236 ____	973 +683 ____
658 +182 ____	862 +332 ____	520 +724 ____	878 +14 ____	795 +965 ____	936 +563 ____	888 +273 ____	338 +542 ____
981 +994 ____	472 +630 ____	522 +253 ____	614 +422 ____	851 +512 ____	336 +886 ____	420 +139 ____	955 +892 ____
744 +302 ____	179 +326 ____	100 +895 ____	344 +319 ____	987 +54 ____	669 +24 ____	528 +60 ____	516 +201 ____
343 +59 ____	987 +565 ____	867 +98 ____	52 +532 ____	759 +414 ____	52 +479 ____	822 +806 ____	648 +115 ____
811 +150 ____	165 +900 ____	606 +839 ____	891 +689 ____	501 +971 ____	55 +953 ____	778 +637 ____	115 +3 ____
282 +517 ____	506 +590 ____	500 +328 ____	171 +173 ____	472 +347 ____	49 +881 ____	957 +384 ____	204 +956 ____
444 +43 ____	399 +983 ____	974 +101 ____	757 +793 ____	237 +125 ____	616 +285 ____	96 +186 ____	783 +743 ____
485 +711 ____	191 +469 ____	650 +16 ____	410 +656 ____	801 +71 ____	502 +463 ____	558 +363 ____	529 +224 ____

24 +534 ___	363 +534 ___	919 +633 ___	541 +742 ___	962 +391 ___	620 +13 ___	640 +934 ___	845 +721 ___
529 +750 ___	990 +377 ___	617 +499 ___	900 +695 ___	420 +495 ___	614 +687 ___	255 +289 ___	941 +847 ___
725 +790 ___	18 +620 ___	329 +818 ___	682 +315 ___	113 +791 ___	458 +574 ___	470 +491 ___	592 +287 ___
493 +511 ___	829 +598 ___	789 +25 ___	566 +258 ___	293 +989 ___	621 +122 ___	407 +735 ___	82 +44 ___
749 +208 ___	615 +733 ___	910 +748 ___	177 +444 ___	848 +431 ___	275 +486 ___	11 +443 ___	811 +633 ___
823 +882 ___	52 +481 ___	914 +664 ___	472 +673 ___	349 +940 ___	50 +708 ___	180 +511 ___	84 +741 ___
816 +290 ___	767 +374 ___	83 +756 ___	558 +945 ___	349 +685 ___	853 +235 ___	757 +192 ___	576 +837 ___
449 +259 ___	117 +634 ___	621 +456 ___	425 +989 ___	410 +567 ___	220 +264 ___	886 +133 ___	973 +243 ___
903 +766 ___	762 +874 ___	129 +191 ___	117 +500 ___	373 +628 ___	736 +417 ___	232 +48 ___	284 +159 ___

143 +296	537 +378	191 +817	818 +578	368 +974	995 +256	563 +539	335 +151
235 +962	134 +467	582 +449	374 +885	55 +723	614 +121	197 +567	936 +584
701 +181	946 +187	375 +63	417 +940	433 +324	873 +379	979 +112	873 +730
254 +809	559 +552	726 +613	101 +918	698 +779	641 +965	785 +433	358 +955
951 +152	826 +581	793 +696	530 +285	401 +389	257 +775	459 +630	123 +761
186 +950	108 +183	364 +826	357 +822	957 +200	954 +260	786 +284	500 +615
283 +746	673 +319	628 +851	834 +490	441 +440	896 +140	798 +916	914 +522

Appendix C

Feedback Letter

Thank you for participating in my study. The present study was conducted in order to compare the test scores of intrusive proctoring versus non-intrusive proctoring. I hypothesized that while being closely observed, the participant would not answer as many addition problems correct. This experiment is beneficial because it would help grow the general information on students when test taking. Knowing this has the potential of assisting educators find the most effective way of proctoring tests and helping their students succeed.

Please note that I am not interested in your individual results; rather, I am only interested in the overall findings based on aggregate data. No identifying information about you will be associated with any of the findings, nor will it be possible for me to trace your responses on an individual basis.

If you are interested in obtaining the final results of this study based on aggregate data, or if you have any questions or concerns regarding any portion of this study, please do not hesitate to let me know now or in the future. My contact information is found at the bottom of this letter.

Thank you again for your valuable contribution to this study.

Sincerely,

Principal Investigator:
XXX XXX-XXX-XXXX (XXX@lionmail.lindenwood.edu)

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