Heterogeneity of Experimental Findings: Evidence from Real-Effort Tasks

Pre-Analysis Material

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The question motivating this experiment is how heterogeneous experimental findings are. For example, how sensitive experimental results are to the demographics of the sample? How do they depend on the output measure used? How critical is the experimental protocol?

We consider these questions in the context of a real effort task that builds on DellaVigna and Pope (2018) and that we run from 5/24/2018 for up to three weeks, or until we reach 10,500 subjects. We run variants of the same experimental treatments, considering different demographic groups, and varying the task used, the measure of effort, and whether subjects know that the task is an experiment. We examine how much the experimental results change in response to these changes, compared to a pure replication. We also aim to elicit which of these changes experts believe will have the most impact; the elicitation will be detailed in a separate registration.

Experiment

The outline of the experiment is as follows. Subjects will choose to participate in this study by selecting it on Amazon's Mechanical Turk service. Before the participants choose to participate, they will be provided with a brief description of the study (a" typing task") which also tells a guaranteed flat-pay for successful submission ($1) and a time estimate for completion (Figure 1). Once in the task, participants are assigned to one of four versions, and within each version they are directed to complete a task with randomly-selected incentive structures.

Version 1 is a direct replication of the task used by DellaVigna and Pope (REStud 2018): participants press two alternating keyboard buttons ('a' and 'b') within a given time period (10 minutes) (Figure 3). There are 16 different randomly-assigned treatments with varying levels and types of incentives, of which 15 are present in DellaVigna and Pope (REStud 2018) and one is an additional treatment which combines a psychological intervention with a piece rate incentive. (There were 3 threshold treatments in the original experiment which we decided not to replicate due to the difficulty of considering them across contexts). For example, some participants will be given bonus payments based on points scored, others will raise money for charity, and some will receive no bonus. All participants are clearly informed of their incentive structure and bonus opportunities before playing their task. There is no deception at any point in this task.

Version 2 is similar to Version 1 except that the task consists of coding the occupation from World War II historical cards for 10 minutes (Figure 4). As in version 1, the participants are randomized in one of 16 treatments with varying levels and types of incentives. The treatments are parallel to the ones used in Version 1.

Version 3 involves coding of WWII cards, as in Version 2. However, this time all subjects are required to code 40 cards as their main task (Figure 5). After the coding of the 40 cards is completed, subjects are randomized into 16 different treatments, parallel to the ones used in Version 1 and 2. The treatments consist of different incentives offered to the participants in case they agree to code additional WWII cards, up to 20 extra cards (Figure 6).

Version 4 is the same as version 3, except that, unlike in Versions 1-3, there is no consent form (Figure 2) prior to participating in the tasks, so subjects do not know that the task is an experiment. (Notice that the participants are coding historical data as part of an economic history project, so this is a data coding assignment.)

Upon completion of the task, participants will be thanked for their contribution and the flat payment of $1, along with any additional money won, will be paid within the designated time period for their treatment (typically within 24 hours).

The key outcome variable is a measure of average effort. The measure of effort differs across the four different versions of the experiment. In versions 1 it is the number of points scored by the subject in 10 minutes, where each point is scored as a result of pressing 'a' then 'b'. In versions 2 it is the number of WWII cards coded by the subject in 10 minutes. In versions 3 and 4 it is the number of extra WWII cards coded by the participants beyond the required 40 cards. Within each version and within each of the 16 treatments that we run in each version, we compute the average of the measure of effort across the subjects in that version-treatment cell.

Table 1 below displays Versions 1, 2, 3, and 4 with the building blocks and differences across the versions. It also shows within each version the 16 treatments that are randomized between subjects.

Sample
The final sample will exclude subjects that:
(1) do not complete the MTurk task within 30 minutes of starting;
(2) exit and then re-enter the task as a new subject (as these individuals might see multiple treatments);
(3) are not approved for any other reason (e.g. they did not having a valid MTurk ID);
(4) In version 1 (a-b typing) do not complete a single effort unit; there is no need for a parallel requirement for version 2 since the participants have to code a first card to start the task;
(5) in version 1 scored 4000 or more a-b points (since this would indicate cheating);

(6) in version 2 coded 120 or more cards with accuracy below 50% (since this would indicate cheating);

(7) in versions 3 and 4 completed the 40 required cards in less than 3 minutes with accuracy below 50%, or completed the 20 additional cards in less than 1.5 minutes with accuracy below 50% (since this would indicate cheating).

Restrictions (1)–(5) are exactly the same as in the DellaVigna-Pope (REStud) experiment; restrictions (6)-(7) are meant to parallel restriction (5) for the new task. We expect that restrictions (3)-(7) are likely to be binding in only a small number of cases. For example, in a pilot of 400 subjects we did not have anyone in categories (3)-(7).

The ideal number of subjects planned for the study is 10,000 people completing the tasks. We advertise for 10,500 subjects to take into account subjects excluded due to restrictions (2)-(7) above. (MTurk would count these subjects are successful completions.) The task will be kept open on Amazon Mechanical Turk until either (i) three weeks have passed or (ii) 10,500 subjects have completed the study, whichever comes first.

Randomization Method
The assignment of subjects into versions and treatments is determined as follows. The subjects are assigned into one of the four versions randomly, with versions 2, 3, and 4 oversampled by 15 percent. This is in anticipation of the fact that the historical task used in version 2-4 will likely have a higher share of subjects not complete the task due to, for example, difficulty in reading cursive writing (employed in these cards). These subjects will thus not pass the sample restrictions above. In pilot data, we observed higher attrition in these versions by about 15 percent. The overweighting is designed to equate as much as possible the post-attrition sample size across the four versions. Within a version, we randomize participants into one of the 16 treatments with equal weights.

Figure 1. Task as Advertized in MTurk

11-12 Minutes Typing Task

Requester: Devin Pope   Reward: $1.00 per HIT   HITs available: 1   Duration: 30 Minutes

Qualifications Required: HIT Approval Rate (%) for all Requesters' HITs greater than 80 ,

Number of HITs Approved greater than 50 , EP0515 has not been granted

HIT Preview

Instructions

Welcome to this 11 to 12-minute typing task.

Select the link below to complete the task. At the end of the survey, you will receive a code to paste into the box below to receive credit for taking this HIT.

You must be at least 18 years old to take this HIT.

Make sure to leave this window open as you complete the survey. When you are finished, you will return to this page to paste the code into the box.

Survey link: http://chicagobooth.az1.qualtrics.com/jfe/form/SV_bHt13D1GP2tmRdr

Provide the survey code here: e.g. 123456
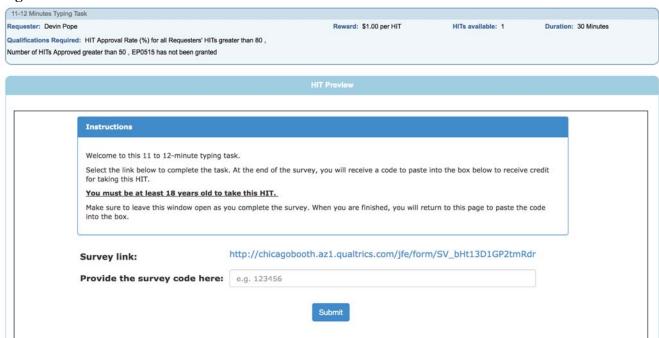
Submit

Figure 2. Consent Form Shown in Versions 1-3

THE UNIVERSITY OF CHICAGO BOOTH SCHOOL OF BUSINESS
Consent for Participation in a Research Study

Study Title: The Effectiveness of Monetary and Non-Monetary Incentives in Inducing Costly Effort

Principal Investigators: Stefano DellaVigna and Devin Pope

IRB Study Number: 18-0144

DESCRIPTION: We are researchers at the University of Chicago doing a research study about the effectiveness of different incentives in inducing effort. As a participant, you will work on a typing task that takes approximately 11-12 minutes.

RISKS and BENEFITS: The risks to your participation in this online study are those associated with basic computer tasks, including boredom, fatigue, mild stress, or breach of confidentiality. The only benefit to you is the learning experience from participating in a research study. The benefit to society is the contribution to scientific knowledge.

COMPENSATION: 1.00 Dollar

MTurk does not allow for prorated compensation. In the event of an incomplete HIT, you must contact the research team and compensation will be determined based on what was completed and at the researchers' discretion.

PLEASE NOTE: This study contains a number of checks to make sure that participants are finishing the tasks honestly and completely. As long as you read the instructions and complete the tasks, your HIT will be approved. If you fail these checks, your HIT will be rejected.

CONFIDENTIALITY: Your Mechanical Turk Worker ID will be used to distribute payment to you but will not be stored with the research data we collect from you. Please be aware that your MTurk Worker ID can potentially be linked to information about you on your Amazon public profile page, depending on the settings you have for your Amazon profile. We will not be accessing any personally identifying information about you that you may have put on your Amazon public profile page.

Any reports and presentations about the findings from this study will not include your name or any other information that could identify you. We may share the data we collect in this study with other researchers doing future studies – if we share your data, we will not include information that could identify you.

SUBJECT'S RIGHTS: Your participation is voluntary. You may stop participating at any time by closing the browser window or the program to withdraw from the study. Partial data will not be analyzed.

For additional questions about this research, you may contact:
Jihong Song
Jihong.Song@chicagobooth.edu
5807 South Woodlawn Avenue, Chicago, IL, 60615, U.S.A

For questions about your rights as a research participant, you may contact:
The Social & Behavioral Sciences Institutional Review Board, University of Chicago
Phone: (773) 834-7835
E-mail: sbs-irb@uchicago.edu

**Please indicate below that you are at least 18 years old, have read and understand this consent form, and you agree to participate in this online research study.**

○ Yes, I agree to participate in this online research study.
○ No, I decline the opportunity to participate in this study.

→

Figure 3. Typing Task in Version 1

0932

Press 'a' then 'b'...

Points: 103
Bonus Payout: $ 0.04

You will be paid an extra 4 cents for every 100 points that you score.

Figure 4. Card Coding Task in Version 2

Time remaining: 9 Minutes, 55 Seconds
You have completed 4 cards.
Your current bonus is $0.02.
Please type the occupation in field 7 in the text box below.

You will be paid an extra 1 cent for every 2 cards you complete. This bonus will be paid to your account two weeks from today.
Type occupation here:

→

Figure 5. Coding of Required Cards in Versions 3 and 4

You have completed 3 of 40 required cards.

Please type the occupation in field 7 in the text box below.

Type occupation here:

→

Figure 6. Coding of Additional Cards in Versions 3 and 4

You have completed 1 additional cards.

Please type the occupation in field 7 in the text box below.

The number of additional cards you complete will not affect your payment in any way.

Please click "I'm Finished" if you want to exit the survey, or click "Continue" if you want to work on more cards.

Type occupation here:

Continue

I'm Finished

Table 1. Description of Experimental Conditions

.	**Version 1** **10-Minute Button Pushing**	**Version 2** **10-Minute Card Coding**	**Version 3** **Extra Card Coding**	**Version 4** **Extra Card Coding; Hawthorne**
P1	Consent Form	Consent Form	Consent Form	**NO** Consent Form
P2	Thank you for participating. Now that you have started, **you may not restart** this survey at any point or else your HIT will be rejected. Please enter your M-Turk ID: _____	Thank you for participating. Now that you have started, **you may not restart** this survey at any point or else your HIT will be rejected. Please enter your M-Turk ID: _____	Thank you for participating. Now that you have started, **you may not restart** this survey at any point or else your HIT will be rejected. Please enter your M-Turk ID: _____	Thank you for participating. Now that you have started, **you may not restart** this survey at any point or else your HIT will be rejected. Please enter your M-Turk ID: _____
R1			The following instructions will describe how this task should be done: In this task you will be coding up conscription records about soldiers in World War II. You will be shown 40 pictures of those records. Your job is to identify the occupation in field 7 of each record and to type it into the text box below each card. If you are unable to determine what the occupation is, or if field 7 is missing from the picture, please type "unclear".	The following instructions will describe how this task should be done: In this task you will be coding up conscription records about soldiers in World War II. You will be shown 40 pictures of those records. Your job is to identify the occupation in field 7 of each record and to type it into the text box below each card. If you are unable to determine what the occupation is, or if field 7 is missing from the picture, please type "unclear".

		For example, if you see the following card, you should type "farmer" into the text box. You don't need to worry about capitalization. (Example Card: Farmer) Please be as careful as possible (we will check the accuracy of your work). Proceed to the next page when you are ready to start the task.	For example, if you see the following card, you should type "farmer" into the text box. You don't need to worry about capitalization. (Example Card: Farmer) Please be as careful as possible (we will check the accuracy of your work). Proceed to the next page when you are ready to start the task.
R2			**40 Required Cards**	**40 Required Cards**
P3	On the next page you will play a simple button-pressing task. The object of this task is to alternately press the 'a' and 'b' buttons on your keyboard as quickly as possible for 10 minutes. Every time you successfully press the 'a' and then the 'b' button, you will receive a point. Note that points will only be rewarded when you alternate button pushes: just pressing the 'a' or 'b' button without alternating	The following instructions will describe how this task should be done: In this task you will be coding up conscription records about soldiers in World War II. You will have 10 minutes to complete as many cards as you can. Your job is to identify the occupation in field 7 of each record and to type it into the text box below each card. If you are unable to determine what the occupation is,	If you are willing, there are 20 additional cards to be coded. Doing this additional work is not required for your HIT to be approved or for you to receive the $1 promised payment. Please feel free to complete any number of additional cards, up to 20. **[INSERT TREATMENT]**. Would you be willing to continue coding more cards? **Yes/No**	If you are willing, there are 20 additional cards to be coded. Doing this additional work is not required for your HIT to be approved or for you to receive the $1 promised payment. Please feel free to complete any number of additional cards, up to 20. **[INSERT TREATMENT]**. Would you be willing to continue coding more cards? **Yes/No**

between the two will not result in points. Buttons must be pressed by hand only (key-bindings or automated button-pushing programs/scripts cannot be used) or task will not be approved. Feel free to score as many points as you can. **[INSERT TREATMENT]** Below is an example of how the task will work. Try pressing 'a' and 'b' alternately to score points. We have limited the point total below to a maximum of 5 as this is just practice, but the actual task will not have a limit. [Example of key press] Proceed to the next page when you are ready to play the task. Your 10-minute task will begin	or if field 7 is missing from the card, please type "unclear". For example, if you see the following picture, you should type "farmer" into the text box. You don't need to worry about capitalization. (Example card: Farmer) Please be as careful as possible (we will check the accuracy of your work). **[INSERT TREATMENT]** Proceed to the next page when you are ready to start the task. Your 10-minute task will begin immediately when the page loads.		

	immediately when the page loads.			
1.1	Your score will not affect your payment in any way.	The number of cards you complete will not affect your payment in any way.	The number of additional cards you complete will not affect your payment in any way.	The number of additional cards you complete will not affect your payment in any way.
1.2	As a bonus, you will be paid an extra 1 cent for every 100 points that you score. This bonus will be paid to your account within 24 hours.	As a bonus, you will be paid an extra 1 cent for every 2 cards you complete. This bonus will be paid to your account within 24 hours.	As a bonus, you will be paid an extra 1 cent for every 2 additional cards you complete. This bonus will be paid to your account within 24 hours.	As a bonus, you will be paid an extra 1 cent for every 2 additional cards you complete. This bonus will be paid to your account within 24 hours.
1.3	As a bonus, you will be paid an extra 4 cents for every 100 points that you score. This bonus will be paid to your account within 24 hours.	As a bonus, you will be paid an extra 2 cents for every card you complete. This bonus will be paid to your account within 24 hours.	As a bonus, you will be paid an extra 2 cents for every additional card you complete. This bonus will be paid to your account within 24 hours.	As a bonus, you will be paid an extra 2 cents for every additional card you complete. This bonus will be paid to your account within 24 hours.
1.4	As a bonus, you will be paid an extra 10 cents for every 100 points that you score. This bonus will be paid to your account within 24 hours.	As a bonus, you will be paid an extra 5 cents for every card you complete. This bonus will be paid to your account within 24 hours.	As a bonus, you will be paid an extra 5 cents for every additional card you complete. This bonus will be paid to your account within 24 hours.	As a bonus, you will be paid an extra 5 cents for every additional card you complete. This bonus will be paid to your account within 24 hours.
2	As a bonus, you will be paid an extra 1 cent for every 1,000 points that you score. This bonus will be paid to your account within 24 hours.	As a bonus, you will be paid an extra 1 cent for every 20 cards you complete. This bonus will be paid to your account within 24 hours.	As a bonus, you will be paid an extra 1 cent for every 20 additional cards you complete. This bonus will be paid to your account within 24 hours.	As a bonus, you will be paid an extra 1 cent for every 20 additional cards you complete. This bonus will be paid to your account within 24 hours.
3.1	As a bonus, the Red Cross charitable fund will be given 1 cent	As a bonus, the Red Cross charitable fund will be given 1 cent for	As a bonus, the Red Cross charitable fund will be given 1 cent for	As a bonus, the Red Cross charitable fund will be given 1 cent for

	for every 100 points that you score.	every 2 cards you complete.	every 2 additional cards you complete.	every 2 additional cards you complete.
3.2	As a bonus, the Red Cross charitable fund will be given 10 cents for every 100 points that you score.	As a bonus, the Red Cross charitable fund will be given 5 cents for every card you complete.	As a bonus, the Red Cross charitable fund will be given 5 cents for every additional card you complete.	As a bonus, the Red Cross charitable fund will be given 5 cents for every additional card you complete.
4.1	As a bonus, you will be paid an extra 1 cent for every 100 points that you score. This bonus will be paid to your account two weeks from today.	As a bonus, you will be paid an extra 1 cent for every 2 cards you complete. This bonus will be paid to your account two weeks from today.	As a bonus, you will be paid an extra 1 cent for every 2 additional cards you complete. This bonus will be paid to your account two weeks from today.	As a bonus, you will be paid an extra 1 cent for every 2 additional cards you complete. This bonus will be paid to your account two weeks from today.
4.2	As a bonus, you will be paid an extra 1 cent for every 100 points that you score. This bonus will be paid to your account four weeks from today.	As a bonus, you will be paid an extra 1 cent for every 2 cards you complete. This bonus will be paid to your account four weeks from today.	As a bonus, you will be paid an extra 1 cent for every 2 additional cards you complete. This bonus will be paid to your account four weeks from today.	As a bonus, you will be paid an extra 1 cent for every 2 additional cards you complete. This bonus will be paid to your account four weeks from today.
6.1	As a bonus, you will have a 1% chance of being paid an extra $1 for every 100 points you score. Approximately one out of every 100 participants who perform this task will be randomly chosen to be paid this reward. This bonus will be paid to the winner's account within 24 hours.	As a bonus, you will have a 1% chance of being paid an extra 50 cents for every card you complete. Approximately one out of every 100 workers who perform this task will be randomly chosen to be paid this reward. This bonus will be paid to the winner's account within 24 hours.	As a bonus, you will have a 1% chance of being paid an extra 50 cents for every additional card you complete. Approximately one out of every 100 workers who perform this task will be randomly chosen to be paid this reward. This bonus will be paid to the winner's account within 24 hours.	As a bonus, you will have a 1% chance of being paid an extra 50 cents for every additional card you complete. Approximately one out of every 100 workers who perform this task will be randomly chosen to be paid this reward. This bonus will be paid to the winner's account within 24 hours.
6.2	As a bonus, you will have a 50% chance of being paid an extra 2	As a bonus, you will have a 50% chance of being paid an extra 1	As a bonus, you will have a 50% chance of being paid an extra 1	As a bonus, you will have a 50% chance of being paid an extra 1

	cents for every 100 points you score. Approximately one out of two participants who perform this task will be randomly chosen to be paid this reward. This bonus will be paid to the winner's account within 24 hours.	cent for every card you complete. Approximately one out of every two workers who perform this task will be randomly chosen to be paid this reward. This bonus will be paid to the winner's account within 24 hours.	cent for every additional card you complete. Approximately one out of every two workers who perform this task will be randomly chosen to be paid this reward. This bonus will be paid to the winner's account within 24 hours.	cent for every additional card you complete. Approximately one out of every two workers who perform this task will be randomly chosen to be paid this reward. This bonus will be paid to the winner's account within 24 hours.
7	Your score will not affect your payment in any way. In a previous version of this task, many participants were able to score more than 2,000 points.	The number of cards you complete will not affect your payment in any way. In a previous version of this task, many workers completed more than 70 cards.	The number of additional cards you complete will not affect your payment in any way. In a previous version of this task, many workers completed the additional cards.	The number of additional cards you complete will not affect your payment in any way. In a previous version of this task, many workers completed the additional cards.
8	Your score will not affect your payment in any way. After you play, we will show you how well you did relative to other participants who have previously done this task.	The number of cards you complete will not affect your payment in any way. After you finish, we will show you how many cards you completed relative to other workers who have previously done this task.	The number of additional cards you complete will not affect your payment in any way. After you finish, we will show you how many additional cards you completed relative to other workers who have previously done this task.	The number of additional cards you complete will not affect your payment in any way. After you finish, we will show you how many additional cards you completed relative to other workers who have previously done this task.
9	Your score will not affect your payment in any way. We are interested in how fast people choose to press	The number of cards you complete will not affect your payment in any way, but your work is very valuable for us,	The number of additional cards you complete will not affect your payment in any way, but your work is	The number of additional cards you complete will not affect your payment in any way, but your work is

	digits and we would like you to do your very best. So please try as hard as you can.	and we would really appreciate your help. So please do as many as you can.	very valuable for us, and we would really appreciate your help. So please do as many as you can.	very valuable for us, and we would really appreciate your help. So please do as many as you can.
10	In appreciation to you for performing this task, you will be paid a bonus of 40 cents. This bonus will be paid to your account within 24 hours. Your score will not affect your payment in any way.	In appreciation to you for performing this task, you will be paid a bonus of 40 cents. This bonus will be paid to your account within 24 hours. The number of cards you complete will not affect your payment in any way.	In appreciation to you for considering performing this task, you will be paid a bonus of 40 cents. You will receive this bonus even if you choose not to complete any additional cards. This bonus will be paid to your account within 24 hours.	In appreciation to you for considering performing this task, you will be paid a bonus of 40 cents. You will receive this bonus even if you choose not to complete any additional cards. This bonus will be paid to your account within 24 hours.
11	We are interested in how fast people choose to press digits and we would like you to do your very best. So please try as hard as you can. As a bonus, you will be paid an extra 1 cent for every 100 points that you score. This bonus will be paid to your account within 24 hours.	Your work is very valuable for us, and we would really appreciate your help. So please do as many cards as you can. As a bonus, you will be paid an extra 1 cent for every 2 cards you complete. This bonus will be paid to your account within 24 hours.	Your work is very valuable for us, and we would really appreciate your help. So please do as many additional cards as you can. As a bonus, you will be paid an extra 1 cent for every 2 additional cards you complete. This bonus will be paid to your account within 24 hours.	Your work is very valuable for us, and we would really appreciate your help. So please do as many additional cards as you can. As a bonus, you will be paid an extra 1 cent for every 2 additional cards you complete. This bonus will be paid to your account within 24 hours.
D	Demographic questions	Demographic questions	**NO** Demographic questions	**NO** Demographic questions
E1			*[Show if not continuing]*	*[Show if not continuing]*

			Thank you for your participation. You will be paid $1.00 for this HIT.	Thank you for your participation. You will be paid $1.00 for this HIT.
E2	*[Show if no bonus]* Thank you for your participation. You will be paid $1.00 for this HIT. We appreciate your effort of scoring XXX points.	*[Show if no bonus]* Thank you for your participation. You will be paid $1.00 for this HIT. We appreciate your work of completing XXX cards.	*[Show if no bonus]* Thank you for your participation. You will be paid $1.00 for this HIT. We appreciate your work of completing XXX additional cards.	*[Show if no bonus]* Thank you for your participation. You will be paid $1.00 for this HIT. We appreciate your work of completing XXX additional cards.
E3	*[Show if bonus]* Thank you for your participation. You will be paid $1.00 for this HIT. You will also be paid a bonus of XXX for every XXX points that you scored. Since you scored XXX points, your total bonus will be XXX.	*[Show if bonus]* Thank you for your participation. You will be paid $1.00 for this HIT. You will also be paid a bonus of XXX for every XXX cards that you completed. Since you completed XXX cards, your total bonus will be XXX.	*[Show if bonus]* Thank you for your participation. You will be paid $1.00 for this HIT. You will also be paid a bonus of XXX for every XXX additional cards that you completed. Since you completed XXX additional cards, your total bonus will be XXX.	*[Show if bonus]* Thank you for your participation. You will be paid $1.00 for this HIT. You will also be paid a bonus of XXX for every XXX additional cards that you completed. Since you completed XXX additional cards, your total bonus will be XXX.
C	Did you have any questions, comments or concerns with the HIT? If so, enter them below:	Did you have any questions, comments or concerns with the HIT? If so, enter them below:	Did you have any questions, comments or concerns with the HIT? If so, enter them below:	Did you have any questions, comments or concerns with the HIT? If so, enter them below: