**Supplemental Materials**

**Recursive Mentalizing and Common Knowledge in the Bystander Effect**

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**EXPERIMENT 1: Private Knowledge and Common Knowledge**

**General Instructions**

By completing this HIT, you will earn $0.40. You can make additional money depending on your decisions in an interaction with another Turker[s]. Any additional money will be paid to you as a "bonus" through Mechanical Turk's Bonus Payment feature. So, **all of the instructions that you read beyond this point refer to money that you can earn above and beyond the $0.40 for completing the HIT.**

In this study, you will participate in an interaction with another Turker[s]. You and the other Turker[s] will play different roles in a hypothetical scenario, and you each will receive unique instructions. **You should not assume that your partner[s] knows [know] what you do, unless we explicitly say so.** You both [all] will make decisions in the interaction, and the amount of money that you earn depends on both your decision and your partner’s [partners’] decision[s].

**Please read all instructions carefully.** There will also be a few comprehension questions at the end of the survey, and you must answer these correctly in order to earn additional money (the bonus payment) from the interaction.

**The Scenario**

In this interaction, you and another [four other] Turker[s] will each play the role of different merchants. Although the story is fictional, the earnings are real and will be paid to you based on the decisions both of you make in the interaction.

**The Scenario:**

Imagine that you are a merchant who works at a large open-air market. You sell your goods out of a stall that you rent from Mr. Smith. Mr. Smith also rents a stall to another [four other] merchant[s] in the market. Every day that you sell your goods at the market, you make $1.00 profit for the day.

A few times a year he expects at least one merchant to help pick up supplies for the stalls. As part of your arrangement with Mr. Smith, you have both [all] agreed to help him pick up supplies when needed. However, only one person needs to help in this task, and this can be you or the other [one of the four other] merchant[s]. Picking up supplies takes half of the day, so whoever helps out only earns 50 cents for the day, instead of the usual $1.00.

If no one shows up to help, then you both [all] have to pay Mr. Smith a fine of $1.00, so you would both [all] earn $0 if neither of you [nobody] volunteer[s] to help on a day that he needs it. As long as at least one person chooses to help, no one gets fined.

To summarize:

* On a day when you sell your goods, you make $1.00.
* On a day when Mr. Smith needs help, if you help you make 50 cents for the day.
* On a day when Mr. Smith needs help, if you do not help you make $1.00 for the day. But *if the other [none of the other] merchant[s] doesn't help [helps]* either, then you both [all] get fined $1.00, and thus *you both [all] make nothing*for the day ($1.00 profit - $1.00 fine).

**Mr. Smith’s communications:**

When Mr. Smith needs help, he can either send a Messenger Boy to inform you of this, or he can sometimes make an announcement on a loudspeaker that can be heard throughout the whole market.

Mr. Smith prefers to use the loudspeaker because then he knows for sure**that both [all of the] merchants heard the message.**However, the loudspeaker is often unavailable, so Mr. Smith instead sends the Messenger Boy to ask for help when he can't use the loudspeaker. Importantly, when the Messenger Boy brings you a message, **only you get this specific message**, unless of course he also brings the same message to the other merchant[s]. Moreover, the Messenger Boy is unreliable and often fails to deliver messages to one or both [more] of the merchants. Nevertheless, Mr. Smith holds both [all] merchants responsible for helping when he needs it, and if no one helps, they will both be [everyone gets] fined, regardless of whether they got the message or not.

To make sure all this is clear, let’s go through a couple of examples:

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Example 1: Mr. Smith does not request help, and you sell your goods as usual. How much would you make for the day?

(\*Reminder: We are asking about your bonus payment only, not including your HIT payment\*)

Total earnings for the day: $1.00

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Example 2: Mr. Smith requests help, and you decide to help. How much would you make for the day?

Total earnings for the day: $0.50

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Example 3: Mr. Smith requests help, and you decide not to help, but the other [one of the other] merchant[s] does help. How much would you make for the day?

Total earnings for the day: $1.00

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Example 4: Mr. Smith requests help, and you decide not to help. The other [none of the other] merchant[s] doesn't help [helps] either. How much would you make for the day?

Total earnings for the day: $0

**Knowledge-level Information (Varied Between-Subjects)**

**Private Knowledge**

**Your information for today:

Private Information**(this information is only visible to you, not to the other merchant[s]):

The Messenger Boy has come to tell you that Mr. Smith needs help today.

The Messenger Boy says that he has not seen the other merchant[s] yet, so you don't know if they will also get the message.

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**Public Information**(this information is visible to both you and the other merchant[s]):

The loudspeaker is silent.

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**Common Knowledge**

**Your information for today:

Private Information**(this information is only visible to you, not to the other merchant[s]):

You do not see the Messenger Boy today.

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**Public Information**(this information is visible to both you and the other merchant[s]):

An announcement has been made on the loudspeaker that Mr. Smith needs help today, so both [all] of you know he needs help.

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Do you want to help Mr. Smith, or stay at the market?

--Help Mr. Smith

--Stay at the market

**Comprehension Questions [Repeated for All Experiments]:**

*All questions had three multiple-choice options: $0, $0.50, or $1.00*

If you and the other merchants **all** help, then what is your bonus?

If you help but **no one else does,** then what is your bonus?

If you choose not to help, but one of the other merchants **does** help, then what is your bonus?

If **none of you** chooses to help, then what is your bonus?

**EXPERIMENT 2: Recursive Knowledge**

*This design was the same as Experiment 1, except for the addition of secondary and tertiary knowledge levels:*

**Secondary Knowledge**

**Your information for today:

Private Information**(this information is only visible to you, not to the other merchant[s]):

The Messenger Boy has come to tell you that Mr. Smith needs help today.

The Messenger Boy says that he stopped by the other [four] stall[s] before coming to see you. He tells you that the other merchant knows [four merchants know] that Mr. Smith needs help today. However, he says that he forgot to mention to the other merchant[s] that he was coming to see you, so the other merchant[s] is [are] not aware that you know Mr. Smith needs help today.

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**Public Information**(this information is visible to both you and the other merchant[s]):

The loudspeaker is silent.

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**Tertiary Knowledge**

**Your information for today:**

 **Private Information**(this information is only visible to you, not to the other merchant[s]):

The Messenger Boy has come to tell you that Mr. Smith needs help today.

The Messenger Boy mentions that he is also heading over to see the other [four] merchant[s], and will let them know Mr. Smith needs help today. The messenger boy will also tell the other [four] merchant[s] that he just came from your stall and told you about Mr. Smith's request. However, the messenger boy will not inform the other merchant[s] that he told you he would be heading over there. So, while the other merchant[s] is [are] aware that you know Mr. Smith needs help today, they are not aware that you know that they know that.

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**Public Information**(this information is visible to both you and the other merchant[s]):

The loudspeaker is silent.

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**EXPERIMENT 3: Replication with Additional Recursive Knowledge Level, and Naturalistic Scenarios**

*These instructions were the same as in Experiments 1-2, except for an additional paragraph about how the messenger delivered the message. And all knowledge levels used more naturalistic descriptions.*

…The Messenger Boy always delivers this message in **a pink envelope**, and this is the **only message that gets delivered in a pink envelope**. So, whenever you see a pink envelope on the counter of your stall, or on the counter of the other merchant’s [merchants’] stall[s], you know that Mr. Smith has requested help that day. Likewise, if the other merchant[s] sees [see] a pink envelop on your [anyone’s] stall counter, they know that Mr. Smith has delivered a request for help to you [them].

**Private Knowledge**

Your information for today:

*The loudspeaker is broken today, so no public information is available.*

A messenger comes by with a message in a pink envelope. You open the envelope, read that Mr. Smith needs help today, and throw the note and envelope away before anyone else sees it.

The messenger says that he hasn’t seen the other [four] merchant[s] today, so it is unlikely that they know Mr. Smith needs help.

**Secondary Knowledge**

Your information for today:

*The loudspeaker is broken today, so no public information is available.*

A messenger comes by with a message in a pink envelope. You open the envelope, read that Mr. Smith needs help today, and throw the note and envelope away before anyone else sees it.

A few minutes later, as you are walking around the market you pass by the other merchant’s [all four of the other merchants’] stall[s]. You see the messenger’s pink envelope on [all four of] their stall counter[s], so you know they [that each of them] got the message as well. However, you don’t get a chance to speak with [any of] them, so they don’t know [none of them knows] you’ve seen their envelope.

**Tertiary Knowledge**

Your information for today:

*The loudspeaker is broken today, so no public information is available.*

A messenger comes by with a message in a pink envelope. Right then you get swamped by a large group of customers, and just leave the envelope sitting on your counter while you attend to them.

As you are helping your customers, you see the other [each of the other four] merchant[s] walk by and see the pink envelope on your counter. So the other merchant [each of the other four merchants] must know that you received the message that Mr. Smith needs help. However, the other merchant doesn’t notice [none of the other four merchants notice] that you saw them pass by, and is [they are all] gone by the time you finish with your customers.

**Quaternary Knowledge**

Your information for today:

*The loudspeaker is broken today, so no public information is available.*

A messenger comes by with a message in a pink envelope. You open the envelope, read that Mr. Smith needs help today, and throw the note and envelope away before anyone else sees it.

Later that day, as you are walking with a colleague from one stall to the next, you see the messenger’s pink envelope on the other merchant’s [each of the other four merchants’] counter[s], so you know that they [all of them] got the message as well. [In each case,] The other merchant [the merchant] sees you look directly at the envelope but when they try to get your attention, you look away and start speaking to your colleague. So the other merchant sees [all four merchants see] you look at their envelope[s], but [each] thinks that you didn’t notice that they saw you.

**Common Knowledge**

Your information for today:

An announcement is made on the loudspeaker that Mr. Smith needs help. Everyone (including you and the other merchant[s]) heard the announcement.

1. Do you want to help Mr. Smith, or stay at the market?

--Help Mr. Smith

--Stay at the market

2. What do you think the other merchant will decide to do?

--Help Mr. Smith

--Not help Mr. Smith