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Other-Regarding Expert Behavior - Economics Experiments

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OTHER-REGARDING EXPERT BEHAVIOR -

ECONOMICS EXPERIMENTS

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OTHER-REGARDING EXPERT BEHAVIOR -

ECONOMIC EXPERIMENTS

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This thesis analyzes two experiments where experts are facing other-regarding versus self-interested choices on behalf of their clients. The experimental models isolate and examine singular aspects of the complex varied transactions that transpire between experts and their clients every day. Prior literature modeling experts in dictator games or expert advice games shows that given a clear choice with direct culpability that experts are willing to make "fair" other regarding decisions that sacrifice some of their own monetary outcome to increase the outcome for others. However, in these same experiments with the same subject, experts are willing to hide behind many different mechanisms that remove this clear culpability and thus divert the blame for their more self-interested choices. Experts are willing to pay $1 to take all the money and run as though the opportunity to share with others did not exist. When the blame for the decision can be placed on another person, on the computer, on chance (a payment distribution with probabilities) the experts tend to switch to less-fair actions. This all implies that people sometimes make fair choices, but whenever there is a screen of plausible deniability, their mental accounting avoids personal culpability for an increase in unfair outcomes. These two experiments test if experts likewise use 1) communication or 2) ambiguity as a deeper screen

than uncertainty in order to find a way to justify unfair choices that they would not make without this opportunity. These economics experiments are performed in a laboratory setting where the element of interest can be isolated, and the other aspects of the transaction are controlled. But the fundamental questions being asked are applicable to many common types of commercial transactions throughout the economy and thus might be informative in thinking about public policy around expert client transactions.

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This is dedicated to Khai-Leif, my friend, son, and an economic genius in his own right.

CHAPTER 1

Expert Recommendations - Treated With and Without Communication

Behavioral economic laboratory experiments testing the effect of communication on experts' recommendations to their clients across a spectrum of certain and risky payout to the client.

1.1 Abstract

Facilitating more communication is frequently proposed to alleviate the predicament of opposing interests and information asymmetry when an expert makes recommendations to their client. However, the dictator game and expert advice literature is full of the expert using every opportunity to obscure their direct culpability to make more self-interested choices. Would experts likewise use communication to hide culpability thereby making recommendation in the expert’s best interests and not the client’s. We tested the effect of communication on expert advice by designing economics laboratory experiments in an expert-advice client-choice game over safe payoffs and a range of risky payoffs. In some sessions the expert provided a recommendation supplemented with text communication and in other sessions with different subjects, the recommendation alone. The experiment did not simply measure the expert’s assumptions about their client’s risk-averse or risk-loving utility preferences. We designed some tasks to require extremely risk-averse client preferences to justify the expert's giving self-interested advice, and other tasks requiring extremely risk-loving preferences. No valid client risk preference assumption would support both self-interested recommendations; thus, such

experts can only be self-interested. We use six varied tasks that possess diverse communication opportunities, to test if communication about varied situations might facilitate different behaviors. Our small sample size leans towards rejecting that communication increases self-interested advice; in some instances, the advice is significantly more other-regarding. We generally observe heterogeneous expert advice and response to communication varying over the six tasks.

1.2 Introduction and Motivation

Expert interactions with clients often have an information asymmetry, where the client must rely on the recommendation and information provided by the expert. When the outcome of this interaction is not aligned, in that the financial benefit of one party comes at the expense of the benefit to the other party, then the quality of the recommendations of the expert becomes suspect. The client is paying the expert for advice, yet the expert may be compensated more for providing the recommendation that is not in the client's interest. The classic case of this is repairs by an automobile mechanic or a plumber, but similar issues arise for some of the transactions in most commercial fields from the grocery store to medical or financial advice. A better understanding of the expert's recommendation behavior might provide insight in public policy and regulations on identifying and protecting the consumer in situations that are most likely to facilitate adverse advice. Further, exploring the effect of communication on these recommendations will help to recognize when communication might help or hurt the quality of the recommendation in different situations.

The experimental economics literature examining other-regarding behavior in dictator games and expert advice games at first had not anticipated that an expert subject would give to their counterparty. This was contrary to classical wealth-based economic utility theory. Some additional component of utility, some measure of self-judgment, social-judgment/norms, fairness, truthfulness, or social welfare was entering into individual's utility choices. In subsequent experiments designed to further understand these choices, the most universal factor was that with added levels of complexity the expert decision makers often switched to more self-interested actions. If all additional distractions and complications increased self-interested behavior, what about the complexity of communication?

The literature promoting transparent full information disclosure lauds communications as a cure to all opposing interest interactions. Public policy even follows this mantra. The car mechanic is required get customer approval of a quote of work to be performed before proceeding. The doctor is required to get informed consent, when possible. But what if communication did not improve the experts' recommendations, and instead experts used communication as an additional complexity to hide their self-interested actions behind. Shouldn't this be tested?

This article primarily examines expert recommendation behavior affecting the welfare of their client counter-party. We examine the quality of recommendation across a range of certain and risky payouts as well as testing the effect of providing added communication along with this recommendation.

The experiment is designed to identify when the expert is taking advantage of any uncertainty to exercise a self-interested wiggle room. Past experiments have had difficulty distinguishing self-interested experts from experts making bad assumptions about the utility-risk profile of their clients. Prior experiments had trouble eliminating the possibility that self-interested recommendations might arise simply because the expert was making assumptions about their client's risk aversion or risk-loving utility function and was making the utility-maximizing recommendation based on those assumptions. In our experiment, by providing a variety of different scenarios where the expert’s self-interested choice would alternately require risk-averse or risk-loving assumptions about the client’s utility function, we are attempting to distinguish persistently self-interested expert behavior from other behavior.

The probability outcomes for the choices are also designed so that, based on previous observations of the general population, it would be unlikely that the participant's utility risk profile would find the choice with a lower expected payment to be beneficial. Thus, even if only recommendation on one side of the risk-averse or -loving profile were made, the “excuse” that the recommendations were made on behalf of an assumption about the client’s utility risk profile would be valid only under extreme profiles.

1.3 Literature Review

There is a very robust literature on dictator games where the expert makes decisions on behalf of both parties. Although this is may be where one starts to study other-regarding behavior, it is important to also distinguish that body of literature from the body of literature that examines the behavior of experts providing advice where the clients are ultimately the decision makers picking the outcome choice. In this case, the welfare of the client is dependent on the expert’s assumptions about the client’s preferences, the quality of the expert’s “choice” of advice, and also the credibility of the advice to inspire the client’s choice. We will examine behavior across a variety of different tasks that consider outcomes with certain payment and various probabilistic distributions of payments; thus, delving into individual utility risk preferences. We will primarily examine the effect of communication on the expert's recommendations. Following is a review of some of the closer influences on this work, though clearly our study of expert recommendations is heavily influenced by the other-regarding choice literature that uses dictator games that provide no client choice.

First, we acknowledge that choices made on behalf of another might be different from the choices one makes for oneself. The expert must make assumptions about the client's utility preferences; what would the client want? Chakravarty et al, 2011 [9] uses lottery choices and sealed-bid auctions to assess the choice behavior when choices are made on behalf of the welfare of another. When making decisions on behalf of the other, the expert advisor makes less risk-averse decisions, than when they are playing the game for themselves and make their own decisions. Rigoli et al, 2018 [56] similarly observed more risk affinity when making choices for others, and even observed some risk-loving choices.

In their literature review Dana and Cain, 2015 [14], find that in the absence of contrary monetary incentives, advice is generally biased towards cautious risk aversion and that well-intentioned policies to promote quality advice often backfire resulting in the opposite effect. That literature review further finds that some of the advice and choices on behalf of others seems to come from the fear of being blamed for losses but also not being given credit for gains; thus, actions on behalf of others are often loss averse. Similarly, Polman and Wu, 2020 [53] in their meta-analysis found 42 papers and more than 100 mixed findings that overall show a small shift towards riskier decisions for others.

Gneezy, 2005 [25] constructed a laboratory experiment with many parallels to our experiment. The comparison was between different payment scenarios as well as comparing the recommendation game and a dictator game[1]. The recommendation game is similar to our baseline task with certain payments and without communication. Actions on behalf of the other were heterogeneous and robust, responding to the compensation structure as well as the recommender versus dictator roles. Rode, 2010 [57] designed an investment-advisor experiment based on Gneezy, 2005 [25] to test the recommendation and choice behavior when the clients know more or know less about the setup of the opposing compensation structure of the games. The expert's advice does not significantly change under the treatments, but the client's trust and rate of following the advice responds to the information when the clients know the payment interest are not aligned. Although their questions are different and they do not utilize probabilities and utility risk preferences, Gneezy and Rode have the closest underlying game structure and experimental design to our experiment, in particular to our base case certain payment task.

Conflicting interest is the root of the problems with the expert recommender situation. Angelova and Regner, 2013 [2] test the behavior of an advisor making recommendation for their client's market choice. Both their and our baseline treatments with certain payments and without communication have a similar conceptual setup. They then go on to test fixed and voluntary payment schemes for the advisor and observe the impact of these different compensation treatments on the advice give. Similar to aligning the expert and client's interests, determining the variable compensation after the results of the game are known had the largest impact on the quality of recommendations. Popova, 2010 [54] is a prior working paper with similar setup and results, it would appear to be an early draft. Kuang, Weber and Dana, 2007 [39] adds a third-

[1] In the dictator game the computer had an 80% probability of following the dictator's choice, trying to mimic the rate clients that disregarded advice. But based on the results, this probably of choice may just provide additional wiggle room for more self-interested behavior.

party advisor to experimental coordination games testing advice and choices. The recommendations of the third-party knowledgeable advisor are followed more frequently when the third party's compensation is known not to be aligned to the outcome of the two-player coordination game that they are providing advice on.

Gehrig et al, 2010 [23] are able to set up a complex investment market in the laboratory with knowledgeable expert financial advisors sharing their own investment strategies for a fee. The best-performing markets were those with competition between experts, and not the case where everyone was knowledgeable of the game state. The interchange and competition of ideas may have added to the competitive market's success.

Holt and Laury, 2002 [31] is a classic paper measuring and identifying a scale for population risk preferences. We utilize their utility function risk scale to design the payment probabilities in each task of our experiment so that a knowledgeable choice of the lesser $5 payment was either dominated by the $10 choice or would require an unlikely extreme risk-loving or extreme risk-averse utility preferences. Thus, were the expert to recommend the $5 choice, this recommendation could only be in the client's interest were the client to be much more risk-loving or risk-averse than the general population.

1.4 Experiment Design

To test the effect of communication on expert-client interactions, we conducted laboratory experiments with college students where designated knowledgeable experts made a binary recommendation to clients, and the partially-informed clients needed to make the final decision. In each recommendation task there is an option A that is most beneficial for the client and an option B that is most beneficial for the expert. The client must rely on the expert's advice when making their decision. We investigate the effect of additional expert communication on the client’s welfare. Does additional text communication from the expert to the client provide helpful transparency and knowledge that improves the client’s outcome, or is communication used by the expert to facilitate the expert’s own self-interest?

The basic choice for the expert will be the recommendation of A), the high client benefit with an expected average client benefit of $10 that will pay the expert $4, versus B), the low client benefit averaging $5 with a payment of $5 to the expert. Option A) could be on the right side or the left side, and option B) would be on the opposite side. The expert will know the probability distribution of payment outcomes for both the left and right option. The client will have limited information, a binary recommendation from the expert sometimes supplemented with a text communication.

In order to evaluate the effect of communication, we need to be able to identify when the expert is making a self-interested recommendation. In the simple case, where the client payment in options A and B is expressed as a certainty of a fixed payment amount, then the larger client payment in option A is other-regarding for the expert, and option B is self-interested. However, when option A, option B, or both options include a probability distribution of various payment amounts, then it is possible that some risk-averse or risk-loving client utility preference may actually favor client option B even though the expected average payment is smaller. Even in the case of a task where only an extremely risk-loving or extremely risk-averse client would prefer option B, if the expert recommends option B it is still difficult to distinguish between an extreme assumption about the client’s utility preferences or the expert's own self-interested behavior. Therefore, we have designed pairs of recommendation tasks where the potential rationale for recommending option B in the first task is incompatible with the rationale in the second task. For example, the expert cannot rationally assume that the client is simultaneously extremely risk-averse and extremely risk-loving.

If the expert recommends the self-interested option B in both paired tasks, the only explanation for the expert's action is self-interest. Using these pairs of recommendation tasks, we will be able to identify the use of communication to facilitate persistent self-interested recommendations versus when communication results in a positive client outcome, possibly benefiting from transparency. If the expert makes only self-interested recommendations in either the extremely risk-averse or the extremely risk-loving cases, then it will be harder to identify the source of their behavior definitively. In the extremely risk-averse case it could be that the expert feels that they have comfortable wiggle room to justify their recommendation only when the choice is risk-averse. Even if the preference for a choice at hand required an improbable extremely risk-averse utility function, the expert may be more comfortable hiding their self-interested recommendation behind this unlikely risk-averse recommendation but would feel uncomfortable in doing so with an extremely risk-loving situation. Alternatively, the expert might believe their client has an extremely risk-averse utility and would thus benefit from such a recommendation. A similar analysis would apply if the situation were reversed, and extremely risk-loving recommendation were being made.

Experts may also be basing their recommendations on some other rationalization or be taking advantage of situations where direct culpability is obscured. Clearly the expert's behavior adjusts to their perception of variations in wiggle room under each task and treatment. Such changes in behavior most likely would reflect the variations of wiggle room and what the expert feels comfortable getting away with. The point is that the experimental situation pairs are constructed such that there is not likely to be some consistent rational assumption about the client's preference, however improbable such an assumption might be. It would be difficult or impossible to recharacterize the self-interested recommendations in the pairs of tasks as consistently other-regarding.

There will be two different treatments, with and without communication. Subjects will participate only in one treatment and the analysis will be between subjects. This design avoids having the behavior in the with-communication treatment bias the behavior in the without-communication treatment and vice versa. For each pair of expert and client participants, the six recommendation tasks in their treatment will be presented in a different random order. In the without-communication treatment, the experts with full information will indicate their recommended option, and the clients with partial information will receive the expert's recommendation before they make their selection. The communication treatment, with a different group of subjects, will have the fully informed experts indicate their recommended option along with a text communication. The partially informed client will receive the expert's recommendation and communication before they make their selection. In each treatment two tasks will be randomly selected for payment.

The six different tasks will vary the payment distribution options for the two possible recommendations. This will change the flavor of the expert's potential personal justifications and change the potential in the communication treatment to exaggerate, persuade, obscure culpability, use half-truths, indicate trustworthiness or character, provide empty justifications, misrepresent, or deceive their client. The tasks were chosen to span different potential communication opportunities and challenges for the expert.

Within each treatment round, we will test baseline recommendation tasks as well as pairs of tasks where recommending both of the self-interested $5 option Bs would require contradictory assumptions about the client's utility preferences. The recommendation tasks between two options will be based on a few different probability distributions of compensation from a fixed set of compensation amounts for the client. Subjects who are assigned the client role will know about the general structure of the choice problem but will not know the probability distributions or which choice is more favorable to themselves. During the recommendation and decision process the clients can speculate about the quality of the recommendations they are receiving. At the conclusion of the task, in the payment phase, experts and clients will be shown the payment outcome of all six tasks, this screen will also indicate which one of these tasks was randomly selected to be paid. Thus, at the end of the session when the clients compare the recommendations they received with their compensation outcomes for each of the six tasks they will be able to form an opinion about the quality of the recommendation provided by the expert. The clients will know only the ex-post outcome not the ex-ante probability distribution, so they will not know for sure if the expert recommended the choice that they, the client, would have made for themselves were they to know the same information as the expert.

There will be 6 recommendation tasks. These tasks will be a choice between recommending the high option A or the low option B where the high option A will on average pay the client $10 and the low option B will on average pay the client $5. The expert will have the opposite incentives where they will be paid $4 if the client choses option A and $5 if the client choses option B. The expert will know the payment distribution of the left and right options and recommend one to their client. The client's payment in each task will follow one of the three probability distribution for the $10 option A and one of the three distributions for the $5 option B. All client payment options will be composed of probabilities of paying $30, $20, $10, $5, $1 and $0.

The first distribution will be a “certain” baseline recommendation task where the payment amount is certain; the high option A always pays exactly $10, and the low option B always pays exactly $5. Were an expert concerned about culpability or truth telling or the client’s outcome, it would be difficult to recommend or communicate an argument in favor of the $5 certain option B over the $10 certain option A.

The second distribution type is a “risky” payment distribution where for the mean high option A compensation is $10, and for the mean low option B compensation is $5, but there is some chance of each of the possible compensation amounts in each of the distributions. Both the risky options have a positive probability of paying each of the possible payment amounts: $30, $20, $10, $5, $1, and $0. These risky payment distributions were selected so that the distribution of the high payment dominates the distribution of the low payment. Note that throughout this document we use the words dominate and dominant in their game theory technical sense to denote the option that yields better payoff than the alternative in all situations, and dominated to denote the option with lower payoff. The payment probability of each nonzero amount for the risky high choice will be larger than the payment probability for the risky low choice. Thus, the only client-oriented justification for recommending the risky low amount over the risky high amount would be if the lowest payment amount of $0 was desirable for the client. There should be no “logical” other-regarding justification for picking the dominated $5 risky option B choice over the dominant $10 risky option A choice.

When a recommendation task is to compare one of these risky options against the opposite certain options, there is plenty of wiggle room for communications of half-truths that could be used by the expert to recommend the self-interested low $5 option. However, this is not the case when both tasks are risky, due to the careful selection of the $10 average option to dominate the probability distribution of the $5 average option. Nevertheless, when both tasks have risk, the culpability for the outcome is obscured by "probabilities" that provide moral wiggle room. Because the high payment option dominates the distribution of the low payment it would be difficult to even write a half-truthful communication to recommend the low payment option.

Thus, communication might be used to facilitate more low recommendations when only one task is risky, but communication might actually facilitate more high recommendations when the high-payment options dominate the low payment both in the case of two certain options as well as in the case of two risky options.

The third style of distribution will include large probabilities of the lowest or highest, extreme payments. These downside and upside distributions are more skewed than the risky payment distributions above. The downside option A, high $10 average payment, recommendation includes a large probability of downside ($0) potential, and the upside option B, low $5 average recommendation, includes a large probability of upside ($30) potential.

These downside and upside distributions will be tested against the ordinary risky options. This will facilitate a situation where both recommendation choices are risky, but there is something salient to communicate so as to recommend the low $5 option. Not only could the expert base their recommendation on a risk preference or risk aversion, but the expert could also communicate about the specific risk of a large downside ($0) or the opportunity of a large upside ($30). These downside and upside tasks are included so as to facilitate opportunities for more diverse communication about the choices. Communication is not limited to some generic description of variation and risk, rather it has the potential to focus on a very specific outcome.

This will also provide contrast for the dominant risky-risky scenario and potentially show that experts differentiate between these risky-risky distributions in their behavior.

In addition to the expert being fully informed about the recommendations they can present to their clients, the clients will be aware of all 6 possible payment amounts ($30, $20, $10, $5, $1, $0) in the two options. Experts but not clients will know the probability of each of the 6 payment amounts for each choice in the task. Clients will not know which choice is the high or low average option. The expert's screen will display the probability of each payment. Since the high payment is twice that of the low payment, with a little examination it should be relatively easy for the expert to know which option could be best for the client even though the expected values of the distributions are not shown and even if the expert does not calculate the exact expected payments. This however does not prevent the expert for hiding behind strategic ignorance; the expert could decide strategically to not ascertain which option has a higher expected payout for their client. This strategic ignorance might assist the expert to be more comfortable exercising self-interested wiggle room.

Table 1 shows the varying probabilities of each payment distribution recommendation task described above. First there are the High-mean $10 choice A distributions: Certain, Risky, and Downside recommendation tasks. Following are the Low mean $5 choice B Distributions: Certain, Risk and Upside recommendation tasks.

	Mean	$30	$20	$10	$5	$1	$0	Description
High								
CH	$10.00			1.000				**C**ertain **H**igh
RH	$10.00	0.100	0.200	0.200	0.150	0.250	0.100	**R**isky **H**igh dominates RL
DH	$10.00	0.100	0.250	0.200	0.000	0.000	0.450	**D**ownside **H**igh
Low								
CL	$5.00				1.000			**C**ertain **L**ow
RL	$5.00	0.050	0.050	0.150	0.150	0.250	0.350	**R**isky **L**ow
UL	$5.00	0.142	0.000	0.000	0.006	0.710	0.142	**U**pside **L**ow

Table 1 Payment Distribution of Choices used in Recommendation Tasks

The numbers listed are probabilities of each dollar amount in each distribution scenario. In various tasks the expert advisor will be presented with pairs of high and low tasks of potential payout schemes for the other paired participant. The expert will then need to choose to recommend the high or the low payment option to their other paired participant.

Table 2 itemizes the 6 recommendation-task scenarios utilizing the above variation of choice options enumerating the probabilities of each payment amount in the choice between option A) and option B). Following the table is a description and discussion of each recommendation task.

	High Option								Low Option						
	Avg	**$30**	**$20**	**$10**	**$5**	**$1**	**$0**		**Avg**	**$30**	**$20**	**$10**	**$5**	**$1**	**$0**
i)	Certain High							vs	Certain Low (dominated)						
	$10	0.00	0.00	1.00	0.00	0.00	0.00		$5	0.00	0.00	0.00	1.00	0.00	0.00
ii)	Risky High							vs	Certain Low (extreme risk averse choice)						
	$10	0.10	0.20	0.20	0.15	0.25	0.10		$5	0.00	0.00	0.00	1.00	0.00	0.00
iii)	Certain High							vs	Risk Low (extreme risk loving choice)						
	$10	0.00	0.00	1.00	0.00	0.00	0.00		$5	0.05	0.05	0.15	0.15	0.25	0.35
iv)	Risky High dominates							vs	Risky Low (dominated)						
	$10	0.10	0.20	0.20	0.15	0.25	0.10		$5	0.05	0.05	0.15	0.15	0.25	0.35
v)	Risky High							vs	risky Low with large Upside potential (extreme risk loving choice)						
	$10	0.10	0.20	0.20	0.15	0.25	0.10		$5	0.142	0.00	0.00	0.006	0.71	0.142
vi)	risky High with large Downside potential							vs	Risky Low (extreme risk averse choice)						
	$10	0.10	0.25	0.20	0.00	0.00	0.45		$5	0.05	0.05	0.15	0.15	0.25	0.35

Table 2 Recommendation Tasks

The numbers listed are probabilities of each dollar amount in each of the 6 tasks. The expert advisor will be asked to recommend one of these two choices for the payment scheme for the other paired participant.

Recommendation tasks:

i) **Certain:** The “certain” baseline recommendation task is where the high option A and low option B pay $10 and $5, respectively, with certainty. There is a direct causality between the expert’s recommendation and the client’s outcome. In the stockbroker example, this choice is similar to picking between a par value high-interest bond and a par value low-interest bond with zero risk, where the broker benefits from a higher commission on the low interest bond. Because the expert’s advice directly defines the outcome there is no wiggle room; therefore, we expect this recommendation task to exhibit a baseline high level of other-regarding behavior. Further in the case of the added text-communication treatment, there are no persuasive arguments or half-truths to support recommending the low choice. Due to the general aversion to lying we would expect the communication treatment to be similarly other-regarding or perhaps even more other-regarding than the treatment without communication.

The next three recommendation tasks are variations on the risky distribution style.

ii) **Risky High:** This recommendation task mixes risky and certain payments. The high recommendation is risky, and the low recommendation is certain. In the interests of their client, an expert might switch from the high recommendation to the low recommendation if they believe their client has a strongly risk-averse utility preference. The level of risk aversion necessary for a client to desire such a choice would correspond to $r > 0.74$, based on the CRRA power utility, which would be labeled "Very Risk-Averse" by Holt and Laury, 2002 [31].

The risky high recommendation task is similar to most choices a stockbroker would present to their clients where higher return comes with higher risk. The broker and client need to balance the desire for return with the aversion to risk as in the choice between a bond (certain income) investment versus a riskier stock investment. However, in the stockbroker case, if investors were well informed, only a "Very Risk-Averse" investor would forgo the risky higher return.

The risky payment option decouples direct culpability for the outcome from the expert's recommendation, providing moral wiggle room for making self-interested recommendations. Thus, we expect more self-interested recommendations than in task i). Further the communication treatment has convenient persuasive half-truths as well as possible risk-aversion preferences to support a robust communication recommending the low $5 choice. It is plausible that communication could further facilitate self-interested recommendation in this task.

iii) **Risky Low:** This recommendation task also mixes risky and certain payments but in the opposite format compared to the previous task. The high recommendation is certain, and the low recommendation is risky. An expert might in the interest of their client recommend the low choice if they believe that their client has a strong affinity for risk. This is not the usual type of investment recommendations that brokers would make, but it would be similar to a broker recommending a low-return risky investment instead of recommending a bond with higher certain returns. The level of risk aversion necessary for a client to desire such a choice would correspond to $r < -1.23$, based on the CRRA power utility, which would be labeled "Highly Risk Loving" by Holt and Laury, 2002 [31].

As in task ii) the risky payment option removes direct culpability enabling moral wiggle room and self-interested recommendations. Further the robust communication options of half-truths or risk-loving preferences could further facilitate self-interested recommendation in the communication treatment, though it may be harder actually or morally to sell a risk-loving preference here compared to the risk aversion preferences in ii).

The assumption about the client's utility preferences needed to justify a low recommendation in this task iii) is contradictory to that in task ii). Thus ii) and iii) are a pair of tasks requiring opposite justifications for the low option B recommendation.

We will utilize this property in our hypothesis test to identify overtly self-interested behavior.

iv) **Dominated Both Risky:** This recommendation task uses the two risky payment options. The High-Risky distributions choice dominates the Low-Risky distributions choice. Each nonzero amount for the High-Risky choice has a larger or equal probability of payment than for the Low-Risky choice. Other than self-interest, there is no sensible justification for recommending the low choice over the high choice; such a recommendation would have to assume that the client desired a higher chance of the lowest outcome, $0. This would be similar to a broker evaluating a high-return and a low-return stock investment with similar risks for a client yet recommending the lower-return investment as the broker's commissions was larger.

The expert's thought process might be that the uncertainty provided by risk is sufficient moral wiggle room to prevent detection by the client of the expert's self-interested action. On the other hand, it is possible that the expert's propriety extends to their own ability or a knowledgeable observer's ability to identify a self-interested action; then the expert may have inhibitions against making the self-interested recommendation just as in the case of certain recommendation task i). We would expect the self-interested actions to fall between the low rate in task i) and the higher rates in tasks ii) and iii).

Unlike the two previous tasks where a strongly risk-averse or strongly risk-loving utility preference might favor the low option B, in this task, because the high option A dominates the low option B, there is no sensible risk-averse or risk loving nor any other utility function that would prefer option B over option A. Nonsensical preferences might include a preference for the minimum payment of $0, a preference to minimize the outcome, a preference to minimize the variance (decreasing the variance by 20%) thereby also minimize the expected outcome (cutting the expected outcome in half). As in the certain task i) we expect that the tendency towards avoiding outright lies in communication has the potential to facilitate more other-regarding recommendation in the communication treatment. Further, we could examine communication from the expert to their client in order to determine whether any less-parametric examination might support recommending the dominated low option B. At this time, we are not aware of any such preference or sales pitch.

The last two recommendation tasks test large probabilities of the extreme upside and extreme downside compensation.

v) **Upside:** The low $5 mean choice has a large probability of upside ($30) reward, whereas the high choice is the same as the High-Risky choice above. The high potential upside is available only with the low $5 mean, so there is a tradeoff between the large potential of a high payment in a choice with a low average payment. This upside potential might rationally be picked were only the highest payment to provide utility (and all the other payments have equal low utility even though the payment amounts varied). In the stockbroker example, the low average return with high upside potential is most like an investment where the broker's sales pitch focuses only on the most favorable outcome and conveniently forgets to address risk or average expected return. A preference for large upside potential could also be expressed as an affinity for risk (lottery loving). For a client to desire such a choice based on the CRRA power utility it would be necessary for $r < -3.11$, this being “Highly Risk Loving” as labeled by Holt and Laury, 2002 [31].

Not only does this task provide more uncertainty that facilitates moral wiggle room, but it provides many relevant ways to communicate recommendations for the low $5 option. We would expect that this task has at least if not more self-interested recommendations as tasks ii) and iii), and that there is the potential for the communication treatment to facilitate even more self-interested action than the treatment without communication.

vi) **Downside:** The high $10 mean choice has a large probability of downside ($0) potential, while the low choice is the same as the Low-Risky choice above. Here, not only does the high choice option have risk, but it also has a large probability of downside potential even though the average compensation is favorable. Using the stockbroker example, this could be like a broker trying to scare their clients away from the higher return stock by focusing only on the worst possible downside outcome so that they can sell a higher commission still risky lower return investment opportunity.

One justification for recommending the low choice in v) or vi) would be based on the utility preference that values either the upside or the downside potential. A justification for v) would focus on the upside and a justification for vi) contrarily would focus on the downside, so recommending the low option in both cases would stretch rationality. We will utilize this pair of recommendation tasks, v) and vi), with opposing justification in our hypothesis testing to identify overtly self-interested behavior.

Alternatively, these upside and downside potential tasks v) and vi) could be examined through the risk-aversion-utility preference lens or other measure of outcome-variance preferences. A preference to avoid a large downside potential could also be expressed as an aversion to risk. The level of risk aversion necessary for a client to desire such a choice would correspond to $r > 0.88$, based on the CRRA power utility, which would be labeled “Very Risk Averse” by Holt and Laury, 2002 [31]. The high upside and downside choices are riskier and have higher variance than the alternative risky choices. Thus, the risk aversion and affinity analysis already applied in ii) and iii) would show v) and vi) to be a pair of tasks requiring incompatible utility preference on risk to justify the recommendation of the Low $5 option B in both cases.

As with task v) the uncertainty in task vi) provides moral wiggle room; further, there are multiple ways to communicate recommendations for the low $5 option. Similar to v) we would expect that vi) has at least as many if not more self-interested recommendations as the risky tasks ii) and iii) as well as more self-interested action than the same task in the treatment without communication.

As indicated in task iv), we could examine the communications in tasks v) and vi) for any additional persuasive points of persuasion used by experts to recommend option B.

In each paired task, a utility-preference reason for recommending option B makes a very improbable assumption about the client’s utility preference and recommending option B in both tasks has no excuse but greed.

We will test the six recommendation tasks and run the two treatments with and without communication on separate test subjects. Thus, our analysis of the communication treatment will be between-subject tests. A primary focus of our analysis will be the effect of communication on the outcome for the clients. We will also utilize the features of the paired recommendation task to further analyze if any types of tasks have more favorable client outcomes and if communication affects the outcomes of the tasks in the same way or differently.

Unfortunately, due to the limitations during COVID, the economics laboratory at SMU was initially shut down for more than a year. With the vaccine, masks, and the resumption of some activities, the economics laboratory has been able to reopen; however, it has been very difficult to recruit subjects and several sessions had to be canceled when one or zero students showed up. Thus, the dataset we have collected for this paper is a small. A total of 34 subjects participated in 5 sessions. For testing the interaction between pairs of subjects we have only 17 data points; of this we have 7 data points for the control no-communication treatment and 10 data points for the communication treatment.

1.5 Theory and Hypotheses

In this section we detail the various Hypotheses to be statistically examined in the subsequent results section.

Hypothesis 1: There exist situations, such as in our recommendation task i) where each possible recommendation has a single outcome and thus the outcome is certain, yet some "expert" subjects will make recommendations against their own self-interest to help others by recommending option A.[2]

First, we will confirm that some participants in recommendation task i) do indeed make the other-regarding recommendations as would be consistent with a large body of literature on other-regarding actions.

Hypothesis 2: Some of the experts who are other-regarding (recommend option A) in the certain baseline recommendation task i) will become self-interested (recommend option B) when there is wiggle room such as risk in tasks ii) and iii).

The tasks Risky High ii) and Risky Low iii) have risky options where one of the recommendations has more than one possible outcome. This risky option could provide an assumed excuse or just wiggle room from the uncertainty for the expert to recommend the Low $5 option B. We will test if risky recommendation tasks ii) and iii) have more self-interested recommendations than the certain baseline task i). We will distinguish (a) actions that might be explained by the expert having specific assumptions about the client's utility function from (b) self-interest actions. This will be done by testing pairs of recommendation tasks that would

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[2] In addition to testing the 10 data points of the with-communication treatment and the 7 data points of the without-communication treatments separately, because of the small sample size we will also perform tests with the combined sample of 17 data points. Although we should not make any definitive conclusions from this combined analysis, it will help us asses if more data collection might lead to results that might be more statistically significant. Were it desired to actually make inferences from testing the combined data we would need to show that the two samples were themselves not statistically different. Given that we are trying to get around an inconclusive test with a small sample size and create a larger sample to test, it is unlikely that such test would be conclusive. This combined testing will be done for *Hypothesis 1-5.*

require opposite contradictory preferences in the client's utility function to justify the expert acting self-interestedly in both recommendation tasks ii) and iii).[3]

Not only would we be confirming the results reported in prior experiments that observed a self-interested shift in behavior in the presence of "risk" as wiggle room, but we may also be showing that for some of the recommender population this self-interested action cannot be justified by assumptions about the client's utility preferences. To the extent that experts only make one of the low recommendations in the risky recommendation tasks ii) and iii) our assessment of their motivations would be indeterminate as they could be self-interested, or they could have unlikely but possible assumptions about the strong risk preference of their clients.

Experts who consistently make other-regarding recommendations will be viewed as other-regarding.[4]

Our sample size is too small to attempt to consider, identify, and adjust our results for strategic self-interested experts who are not playing the simple unsophisticated pure self-interested strategies, but we will nonetheless examine this case from a theoretical point of view. There may be sophisticated self-interested experts who believed that there are so many self-interested experts that clients might start doubting the recommendation (potentially making the opposite choice from the recommendations). These sophisticated self-interested experts might find it advantageous to recommend A in the hopes that the client would choose B some of the

[3] Given our small sample size this test may be problematic or statistically inconclusive, at best we can show the numeric count of participants in each category.

[4] We may be slightly overestimating this group to include a small fraction of the strategic self-interested experts playing a mixed strategy [if their strategy was at a rate of p recommend A, and (1-p) recommend B and there was k fraction of such sophisticated expert then p^2k strategic self-interested participants would be mistaken for other-regarding]. Any self-interested experts who are unsophisticated playing pure strategies will not make any other-regarding recommendations and thus will not be included in this count.

time. They would maximize their return playing a mixed strategy making recommendations for both A and B randomly at different times. [5]

> **Hypothesis 3**: In recommendation task iv) where the risky-high option dominates the risky-low option, recommenders will be more self-interested (recommending option B) than the baseline certain task i), but less self-interested than the risky vs. certain tasks ii) and iii).

If experts make more self-interested recommendations in the risky-dominated recommendation task than in the risky vs. certain tasks, then they clearly do not care about the appearance of propriety (the existence of an assumption that justifies their action) to themselves, the experimenter, or to other knowledgeable observers who can identify that A dominates B. The only reason such an expert might be more self-interested is that they felt that there was less scrutiny in this task where all payments are random. Then a non-knowledgeable observer, such

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[5] There may be cases where more than half of the experts are other-regarding. Then the self-interested sophisticated strategist will play a pure self-interested strategy.
If more than half are unsophisticated self-interested pure strategists (always give the self-interested and not other-regarding recommendation), then the clients should always do the opposite of the recommendation. In this case, strategic self-interested experts will actually give the other-regarding recommendation expecting the client to do the opposite.
If the mix of other-regarding participants was R and un-sophisticated Self-interested was S; then the fraction of self-interested sophisticated strategists T = 1-R-S will recommend the other-regarding option t = (0.5-R)/(1-R-S) of the time, and (1-t) = (0.5-S)/(1-R-S) will recommend the self-interested option. This will result in the self-interested option being recommended in both cases $(1-t)^2T$ of the time by such experts.
In truth it may be a little more complicated than this as there is a middle group who, depending on the available wiggle room, will switch between making other-regarding R type recommendation and self-interested S type recommendations. However, the strategic players T could assess the portion of experts switching between these two strategies and calculate their own probability distribution for that scenario based on the proportion of experts playing the R and S strategies for that scenario. Using this updating strategy, the formulas above would hold, but need to be different for each scenario.

as their client, could not determine the quality of their recommendation based on the outcome of the task and the payment drawn for the client.

If Hypothesis 3) is correct, then to some extent experts care about the appearance of propriety to knowledgeable observers including themselves.

If participants were more other-regarding in the risky dominated recommendation task iv) than in the certain baseline i), then they would somehow have failed to realize that in the certain baseline tasks the certain high outcome dominates the certain low outcome even more strongly than the probability distributions in iv). It is most likely that iv) is more self-interested than i) though in many ways this can be viewed as a linked pair of tasks where the high $10 option A) choice dominates the low $5 option B) choice. In many ways we expect the behavior in these two tasks to be similar, albeit for the risk component of both options in task iv). Thus, the difference between these two tasks can be viewed as the wiggle room taken by the expert for the existence of uncertainty in both options of task iv) even though there is no utility preference justification in either task. This is slightly different than the wiggle in task ii) and iii) that could be justified by assumptions about the client's strong risk utility preference, even though those assumptions are contradictory if the low options is recommended in both tasks.

> **Hypothesis 4**: Some of the experts who are other-regarding (recommend option A) in the risky recommendation tasks ii) and iii) will be become self-interested (recommend option B) when there is the additional wiggle room of upside or downside potential tasks v) and vi). Combining with Hypothesis 2: Some of the experts who are other-regarding (recommend option A) in the certain baseline recommendation task i) will be become self-interested (recommend option B) when there is the additional wiggle room of upside or downside potential tasks v) and vi)

Here in addition to utilizing the wiggle room provided by risk (outcomes are not certain and the client cannot directly trace the outcome to the quality of the expert's recommendation), experts are also able to justify their action by recommending the alternative with upside potential or avoiding the alterative with downside risk. As there are more hypothetical ways to justify self-interested action, we expect to observe additional self-interested behavior. As in Hypothesis 2, again we have a matched pair of contradictory justifications for making the self-interested recommendation that will help us identify purely self-interested actions from recommendations that might have a justification through assumptions about the client's preferences. Here in recommendation task v) the expert would need to focus on the upside potential, overriding consideration of average return and in vi) the expert would need to focus on the downside risk, overriding consideration of average return.

We will test if the upside potential recommendation task v) and the downside risk task iv) have more self-interested recommendations than the risky-dominated task vi). Further we will test if experts use contradictory justification for their self-interested recommendations by choosing both of the contradictorily justified self-interested recommendations in v) and vi). We will be increasing the depth of the experimental literature on self-interested wiggle room to include large upside and downside potential, as well as showing that the double version of self-interested action in these tasks cannot be justified by assumptions about the client's utility preferences.

We could also draw similarities between risk affinity and aversion profiles in these upside and downside recommendation tasks with the risky tasks ii) and iii) in that the selection of the low option B in both pairs of tasks could involve an assumption about risk preferences. Though risky versus certain task ii) and iii) are simpler than the upside and downside tasks as the risky option is compared to the certain task in ii) and iii). Thus, this comparison would have multiple reasons for differences and the potential root cause of any difference could not be isolated to one reason.

Following are the central theses of our test of the effects of communication:

Hypothesis 5: Communication will be used to rationalize or justify bad recommendations enabling recommenders to be more self-interested (recommend option B) than recommendation tasks in the without communication treatment.

Hypothesis 6: The communications treatment will have less self-interested (recommend option B) effect on the two recommendation tasks where the high option dominates the low option in the certain recommendation task i) and the risky dominated task vi).

Despite all the hopes that the transparency of communication can help improve the quality of recommendations, when the expert recommender controls the content of this communication, the communication can be used to select only part of the picture (possibly even without lying) to promote the recommenders' self-interests. The communication in this experiment is unstructured and thus the expert may be more prone to self-interest and manipulation of the communication than in more structured communication environments. Given the opportunity to use the communication of selective half-truths to promote one's self-interest, subjects in the expert role could utilize this wiggle room more than when they lack the ability to focus the choice on facts favorable to their interests. Thus, they might be less bound by propriety when able to shift the focus with communication. A failure of rejection of Hypothesis 5 would support these interpretations.

However, in some tasks particularly the baseline certain recommendation task i) and also the risky dominated task iv), have fewer facts that can be manipulated towards the expert's self-interests. Then, it is possible that experts will remain more other-regarding than in the other communication recommendation tasks where elements of uncertainty or risk preferences could be highlighted in order to promote the low option B selection. This interpretation would be supported if Hypothesis 6 is not rejected.

This experiment was designed to test paired tasks [ii) and iii) as well as v) and vi)] to show that self-interested behavior (recommending B) in both tasks could not be justified by consistent assumptions about the client's utility function. However, there is also the possibility that self-interested behavior is more prevalent in risk-averse or risk-loving tasks. If this is observed, then the direction of this action can be tested to see if that direction of action is significant. However, the design of this experiment does not have a definitive way to distinguish between two explanations: Is this action necessarily due to assumptions about the client's utility function? Or is the action merely due to the expert's comfort that the task provided a better wiggle room opportunity. Those potentially making judgement about this action would be more comfortable with a recommendation that might be explained by that utility risk profile. Presumably in either case, the assumption or the comfort, would be biased towards self-interested action that was consistent with risk-aversion and that is generally the risk profile used to describe expected human behavior or prudent behavior.

1.6 Results

We test six recommendation tasks and two treatments, with and without communication. Pandemic restrictions severely limited our sample size. Where possible we performed statistical tests, even if the expectation was that it would be difficult to show significance. We considered p values less than 0.05 to be significant, but all findings should really be taken just as a preliminary investigation and suggestive of what further investigations might find.

First, we summarize the results of the experiments in *Table 3* through *Table 6*. Clients are presented with six different tasks with different distributions in the high- and low-payment categories numbered i to vi, as described in section 2.4 Experimental Design. The payment categories are Certain, Risky, $30 Upside, or $0 Downside. *Table 3* presents the control runs with no communication. There the expert can only recommend the left or right option to the client. The table summarizes what fraction of the time the expert recommended the high $10 option and what fraction of the time the client received $10. The expert usually recommended the $10 option only for the baseline i task where both payments are certain and for task v with the $30 Upside, but otherwise gave more self-interested recommendations. The outcomes chosen by the clients are not identical to the expert recommendations. In aggregate 50% of the time the high option is recommended, and 52% of the time the high option is chosen, but 31% of the time the advice is not followed. When the advice is not followed, presumably there is distrust in the motives and advice of the expert; it may be that the client believes the advice to be wrong and is simply following a strategy of doing the opposite, or there may be a more complex mixed strategy in play.

				Control No Communication			
				A Expert's Advice		B Client's Choice	
#	**$10**	**$5**	**N**	**n $10**	**Fraction**	**n $10**	**Fraction**
i	Certain	Certain	7	5	0.71	4	0.57
ii	Risky	Certain	7	3	0.43	4	0.57
iii	Certain	Risky	7	2	0.29	4	0.57
iv	Risky Dominates	Risky	7	4	0.57	2	0.29
v	Risky	$30 Upside	7	6	0.86	6	0.86
vi	$0 Downside	Risky	7	1	0.14	2	0.29

Table 3 Control. Expert and client responses with no Communication to client

The control had 7 expert client pairs (N). Fraction in A is the fraction of time the expert recommends the high $10 choice, n/N. Fraction in B is the fraction of time the client's choice resulted in a $10 payoff, n/N.

The second treatment, presented in *Table 4*, is the communication treatment, where the expert, in addition to recommending the left or right option, provides text communication about the recommendation to the client. Here the high option is recommended 70% of the time, and the high option is chosen 60% of the time. The advice is ignored 27% of the time (similar to the 31% without communication); however, because of the influence of communication, it would be hard to isolate the difference between simply not trusting the expert (as in the no communication treatment), or not trusting the particular text of the recommendation as the reason for provoking either an opposite choice or a mixed strategy. The statistical significance in the improvement in other-regarding recommendation will be explored when testing the hypotheses.

				Treatment Communication			
				A Expert's Advice		B Client's choice	
#	$10	$5	N	n $10	Fraction	n $10	Fraction
i	Certain	Certain	10	8	0.80	8	0.80
ii	Risky	Certain	10	4	0.40	3	0.30
iii	Certain	Risky	10	8	0.80	8	0.80
iv	Risky Dominates	Risky	10	8	0.80	7	0.70
v	Risky	$30 Upside	10	10	1.00	5	0.50
vi	$0 Downside	Risky	10	4	0.40	5	0.50

Table 4 Treatment. Expert and client responses with communication to the client

The treatment had 10 expert client pairs (N). Fraction in A is the fraction of time the expert recommends the high $10 choice, n/N. Fraction in B is the fraction of time the client's choice resulted in a $10 payoff, n/N.

Table 3 and *Table* 4 are the raw data. Now we proceed to compile them in different ways for our tests. Due to the small sample size, some of the hypotheses will have to be tested using the combined results of the communication and control treatments. These aggregated results are summarized in *Table 5*. The behavior of both expert and client differs between the tasks, and the statistical significance of this will be tested.

				Total of Treatment and Control			
				A Expert's Advice		B Client's Choice	
#	$10	$5	N	n $10	Fraction	n $10	Fraction
i	Certain	Certain	17	13	0.76	12	0.71
ii	Risky	Certain	17	7	0.41	7	0.41
iii	Certain	Risky	17	10	0.59	12	0.71
iv	Risky Dominates	Risky	17	12	0.71	9	0.53
v	Risky	$30 Upside	17	16	0.94	11	0.65
vi	$0 Downside	Risky	17	5	0.29	7	0.41

Table 5 Total – Aggregate of Treatment and Control

Aggregate of 7 trials in Table 3 and 10 trials in Table 4. Fraction in A is the fraction of time the expert recommends the high $10 choice, n/N. Fraction in B is the fraction of time the client's choice resulted in the high $10 payoff, n/N.

Other hypotheses concern the differences between the control and the communication treatments. These differences are summarized in *Table 6* for analysis. Communication tended to have a positive effect on most of the recommendations except task ii. The behavior differs between treatments and tasks; the significance of this will be examined by the later hypotheses.

			Control No Communication			**Treatment Communication**			**Difference Com-Cont**	
#	**$10**	**$5**	**N**	**A Fraction**	**B Fraction**	**N**	**A Fraction**	**B Fraction**	**A Advice**	**B Chose**
i	Certain	Certain	7	0.71	0.57	10	0.80	0.80	0.09	0.23
ii	Risky	Certain	7	0.43	0.57	10	0.40	0.30	-0.03	-0.27
iii	Certain	Risky	7	0.29	0.57	10	0.80	0.80	0.51	0.23
iv	Risky Dominates	Risky	7	0.57	0.29	10	0.80	0.70	0.23	0.41
v	Risky	$30 Upside	7	0.86	0.86	10	1.00	0.50	0.14	-0.36
vi	$0 Downside	Risky	7	0.14	0.29	10	0.40	0.50	0.26	0.21

Table 6 The Effect of Communication

Fraction in A is the fraction of time the N experts recommend the high $10 choice. Fraction in B is the fraction of time the N clients' choice resulted in the high $10 payoff. The last two columns show the change in fraction attributable to communication calculated as a difference: Communication - Control [denoted as Com – Cont].

The rest of this section will use these experimental results to test the Hypotheses put forth in the previous section. Occasionally we used the combined treatments or tasks in an attempt to stretch the sparse data as far as possible in detecting potential trends. If we had more data, this would not be necessary.

We now consider Hypothesis 1, that some experts will make other-regarding recommendations that are contrary to their self-interest. We will test the control and treatment groups first separately and then combined to show that in certain-certain scenario i) some expert participants make the high $10 recommendation rather than the low $5 recommendation. Self-interested experts could exhibit one of two possible strategies: a pure strategy of recommending the low $5 choice, or a random mixed strategy that conveys no information by recommending each choice with some probability. These probabilities might take maximum advantage of the mix of behavioral strategies of clients. In the simplest case this could be equal probabilities. Thus, a selection of self-interested experts might recommend the high $10 choice somewhere between never or half of the time. Therefore, we will test if the recommender population lies anywhere on this spectrum between 0 and 0.5. We utilize the cumulative Beta distribution, to see what the probability is that the observed sample has an expected probability X between 0 and 0.5. Even with this very small sample the treatment and total population have a p value less than 0.05; thus, it is rejected that these experts are acting in a self-interested manner, see *Table 7*. Even the small control population has a tendency towards other-regarding behavior, though it is not statistically significant. This finding is consistent with the large body of literature on other-regarding behavior.

Test group	N	n recommending $10	Fraction X	Beta Distribution p value X<0.5
i) $10 Certain High vs $5 Certain Low				
Control with No Communication	7	5	0.71	0.1094
Treatment with Communication	10	8	0.80	0.0195
Total	17	13	0.76	0.0106

Table 7 Testing Task i) $10 Certain High vs $5 Certain Low for Other-Regarding Behavior.

Next, we consider Hypothesis 2, that experts take advantage of wiggle room. We will test if experts make more self-interested recommendations in the task with risky payout distributions. We will test risky-high ii) and risky-low iii), compared with the certain payout in baseline task i). For these and subsequent comparisons, testing the null hypothesis if two samples exhibit the same behavior, we will utilize both a Chi-Squared test and a student-t test, on the various populations we can test separately and combined. In this case we can test the 2 x 2 matrix of:

control and communication treatments for tasks ii) and iii); the combined subtotals and grand total can all be tested against the base case certain task i). The data for this test are compiled in *Table 8*.

			Control No Communication			Treatment Communication			Total Com & Cont		
#	$10	$5	N	A $10	B $10	N	A $10	B $10	N	A $10	B $10
i	Certain	Certain	7	0.71	0.57	10	0.80	0.80	17	0.76	0.71
ii	Risky	Certain	7	0.43	0.57	10	0.40	0.30	17	0.41	0.41
iii	Certain	Risky	7	0.29	0.57	10	0.80	0.80	17	0.59	0.71
	Total	Risky ii & iii	14	0.36	0.57	20	0.60	0.55	34	0.50	0.56

Table 8 Hypothesis 2 – risky vs. certain wiggle room behavior – compare tasks ii and iii vs. i. A $10 is the fraction of time the N experts recommend the high $10 choice. B $10 is the fraction of time the N clients' choice resulted in the high $10 payoff. The total combines the communication treatment [Com] and the control without communication [Cont].

The above risky task ii), certain task iii), and combined subtotals are all tested to see if they have less other-regarding behavior than the baseline certain task i). *Table 9* shows the one-sided student t-test statistics. Although there are four significant results in the first row, for most segments of the data the behavior was not significantly changed.

			Control No Communication		Treatment Communication		Total Com & Cont	
#			A t-test	B t-test	A t-test	B t-test	A t-test	B t-test
ii	$10 Risky	vs. i Certain	0.158	0.500	0.037	0.012	0.019	0.044
iii	$5 Risky	vs. i Certain	0.063	0.500	0.500	0.500	0.143	0.500
	Total ii & iii	vs. i Certain	0.068	0.500	0.145	0.096	0.036	0.160

Table 9 Hypothesis 2 – student t-test risky vs. certain wiggle– compare tasks ii and iii vs. i. t-test shows the one-sided student t-test statistics that the i) certain task is more other-regarding. The total combines the communication treatment [Com] and the control without communication [Cont].

Continuing with Hypothesis 2, that experts take advantage of wiggle room, we will use the data of Table 8 and the statistics of Table 9. In particular for the control no-communication treatment as well as for risk-loving scenario iii) $10 certain or $5 risky, the outcome choices made by the client (participant B) were not distinguishable from the baseline certain task i). Compared to the baseline certain i) there was a significant shift towards self-interested recommendations in the risk-averse scenario ii) $10 risky or $5 certain options when supplemented with communication (t-test 0.037), and the client's choices also shifted towards more expert-self-interested choices (t-test 0.012). On the other hand, in all the other scenarios [both ii) and iii) no communication controls as well as iii) communication treatment] the choice outcome showed no deterioration towards expert directed self-interested outcomes. Further the recommendations in the communication treatment iii) task did not shift.

In the no-communication control task iii) $10 certain or $5 risky options, the expert recommendations tended to be more self-interested, although this difference was not statistically significant (t-test 0.063). This task is anomalous in that even though the recommendations shifted towards self-interested, the client choice outcomes seemed not to shift at all, but likely this should not be interpreted as a result. What is strange, is that this is the no-communication control, and there should be no way for the client to determine when the recommendations are good or bad. Perhaps because of the random draw of this small sample size clients in this case were randomly lucky at guessing when to not believe the recommendations, an anomaly we might expect to disappear in a larger sample.

Although the total results show a statistically significant improvement in other-regarding recommendations (t-test 0.036), there is heterogeneity in the behavior observed when analyzed by treatment and task characteristics. The clients' choices show a shift that is not statistically significant (t-test 0.16). A larger sample size might provide more clarity.

The experiment was designed to test recommendation task pairs (tasks ii and iii) that would require opposite and conflicting assumptions about the client's risk preferences in order to justify that the expert make self-interested recommendations in both tasks. We will show the data parsed in a way appropriate for this analysis, but the small sample size does not allow statistical analysis, see *Table 10*. The observed behavior is heterogeneous, and we cannot extract a trend without more participants.

	Control No Communication		**Treatment Communication**		**Total Com & Cont**	
Risky ii) & iii)	**n**	**A Advice Fraction**	**n**	**A Advice Fraction**	**n**	**A Advice Fraction**
Both Self-Interested	3	0.43	1	0.10	4	0.24
Only Risk-averse ii)	1	0.14	5	0.50	6	0.35
Only Risk Loving iii)	2	0.29	1	0.10	3	0.18
Total Mixed	3	0.43	6	0.60	9	0.53
Both Other-Regarding	1	0.14	3	0.30	4	0.24
N pairs	7		10		17	

Table 10 Hypothesis 2 – analysis of paired task ii and iii.

A Advice Fraction is the total fraction of experts exhibiting that behavior in tasks ii) and iii). The total combines the communication treatment [Com] and the control without communication [Cont].

The data in *Table 10* are set up to show how analysis would proceed with a larger data set. Starting with the traditional coding, for each task any other-regarding recommendation/decision is coded with $10 A = 1 and $5 B = 0. In this traditional coding AA = 2, AB and BA =1 and BB =0. Here instead a categorical coding is used: AA = other-regarding, AB and BA = potentially motivated by one type of extreme risk preferences, and BB = self-interested. We could analyze the mix of the population in these categories under 2 x 2 treatments.

The two paired task categories would be the two risky versus two certain tasks (tasks ii and iii) as well as the risky versus upside or downside (tasks v and vi); and then there is also the no-communication versus communication treatment. Within each of the behavioral categories, adjacent cells on the 2 x 2 matrix could be tested to see if the proportion of the population exhibiting that behavior were similar or different. Did communication or the type of risk change the behavior?

Hypothesis 3 has two parts: (3a) that the risky-dominated task iv) will be more self-interested than the baseline-certain task i), and (3b) that task iv) will be more other-regarding than the risky versus certain tasks ii) and iii). We will combine part 3b tasks ii) and iii) for purposes of testing. See the results of the experiment in *Table 11*.

			Control No Communication			Treatment Communication			Total Com & Cont		
#	$10	$5	N	A $10	B $10	N	A $10	B $10	N	A $10	B $10
iv	Risky Dominates	Risky	7	0.57	0.29	10	0.80	0.70	17	0.71	0.53
	Versus										
i	Certain	Certain	7	0.71	0.57	10	0.80	0.80	17	0.76	0.71
ii&iii	Risky vs Certain	Total ii & iii	14	0.36	0.57	20	0.60	0.55	34	0.50	0.56

Table 11 Hypothesis 3 – Risky dominated task iv wiggle behavior versus task i, ii, and iii. This table organizes the data for tests in Table 12. A $10 is the fraction of time the N experts recommend the high $10 choice. B $10 is the fraction of time the choice of the N clients resulted in the high $10 payoff. The total combines the communication treatment [Com] and the control without communication [Cont].

The recommendations for the risky dominated task iv) and the pursuant choices tend to be more self-interested than for the baseline certain task i), but the one-way t-test does not show statistical significance, see first row of *Table 12*. Hypothesis 3a is rejected for lack of significance. In the communication treatment, both tasks result in relatively high, 80%, other-regarding recommendation, and no difference is observed. In the second row of *Table 12*, testing Hypothesis 3b, when the risky dominated task iv) is compared to the two risky versus certain tasks [ii) and iii)] the results are mixed in the direction of change and are not significant, rejecting Hypothesis 3b. The risky dominated task iv) produces more other-regarding recommendations, but the choice outcomes in the no communication control treatment move in the opposite direction (possibly just due to the small sample size). In *Table 12* for the comparisons with task i), the one-way t-test is testing if the risky dominate task iv) is more self-interested, for tasks ii) and iii) the one-way t-test is for iv) to be more other-regarding.

		Control - No Communication		**Treatment Communication**		**Total Com & Cont**	
Test More Other-Regarding	**Test More Self-Interested**	**A t-test**	**B t-test**	**A t-test**	**B t-test**	**A t-test**	**B t-test**
i) $10 & $5 Certain	vs. iv) risky dominated	0.306	0.158	0.500	0.314	0.354	0.152
iv) risky dominated	vs. Total risky ii) & iii)	0.187	0.881	0.145	0.223	0.084	0.577

Table 12 Hypothesis 3 – student t-test for risky dominated task iv versus task i, ii, and iii. Statistical tests of the data in Table 11. t-test shows the one-sided student t-test statistics that the iv) risky dominated task is more self-interested than the certain task i) and is more other-regarding than the risky task ii) and iii). The total combines the communication treatment [Com] and the control without communication [Cont].

The limited evidence is mixed and cannot provide a statistical test for Hypothesis 3 with this small sample.

Hypothesis 4 posits that upside and downside risk in task v) and vi) will provide additional opportunity for experts to be more self-interested than the risky versus certain tasks ii) and iii) or the certain task i). The data for this comparison are in *Table 13*.

			Control No Communication			Treatment Communication			Total Com & Cont		
#	$10	$5	N	A $10	B $10	N	A $10	B $10	N	A $10	B $10
i	Certain	Certain	7	0.71	0.57	10	0.80	0.80	17	0.76	0.71
ii	Risky	Certain	7	0.43	0.57	10	0.40	0.30	17	0.41	0.41
iii	Certain	Risky	7	0.29	0.57	10	0.80	0.80	17	0.59	0.71
ii&iii	Total	Risky	14	0.36	0.57	20	0.60	0.55	34	0.50	0.56
v	Risky	$30 Upside	7	0.86	0.86	10	1.00	0.50	17	0.94	0.65
vi	$0 Downside	Risky	7	0.14	0.29	10	0.40	0.50	17	0.29	0.41
v&vi	Total	Up/Down-side	14	0.50	0.57	20	0.70	0.50	34	0.62	0.53

Table 13 Hypothesis 4 - upside and downside risk in task v) and vi) is more self-interested.

This table organizes the data for tests in Table 14. A $10 is the fraction of time the N experts recommend the high $10 choice. B $10 is the fraction of time the N clients' choice resulted in the high $10 payoff. The total if combining both the communication treatment [Com] and the control without communication [Cont].

The statistical analysis of any additional self-interested behavior for the upside and downside risk of task v) and vi) is in *Table 14*. The recommendations are not consistent with this hypothesis. In particular, experts are averse to recommending the extreme risk-loving task v) where the $5 average payout has a lottery-like potential to pay $30, but otherwise pays little. This aversion is heightened in the communication treatment. However, in particular for task v) in the communication treatment, a consistent recommendation of the $10 option resulted in 50% of the clients not selecting the $10 recommended option.

		Control No Communication		Treatment Communication		Total Com & Cont	
Test More Self-Interested	**Test More Other-Regarding**	**A t-test**	**B t-test**	**A t-test**	**B t-test**	**A t-test**	**B t-test**
v Up & vi Downside	vs. i Certain	0.187	0.500	0.288	0.061	0.152	0.118
v $30 Upside	vs, iii Risk-loving	0.985	0.865	0.925	0.088	0.993	0.362
vi $0 Downside	vs. ii Risk-averse	0.135	0.158	0.500	0.806	0.244	0.500
v Up & vi Downside	vs. ii & iii Risky	0.768	0.500	0.740	0.380	0.832	0.406

Table 14 Hypothesis 4 – Test if upside and downside tasks v) and vi) are more self-interested.

Statistical tests of the data in Table 13. t-test shows the one-sided student t-test statistics that the risky tasks, v) the $30 Upside and vi) the $0 Downside tasks, are more self-interested than the certain task i) or risky tasks ii) and iii). The total combines the communication treatment [Com] and the control without communication [Cont].

Hypothesis 5 proposes that communication will be used to enable selfish, self-interested recommendations. We first follow the classical analysis of the change in recommendation presented above in *Table 6*. The change in recommendations is in the wrong direction or insignificant (task ii) so statistical analysis of this (*Table 15*) will not support the hypothesis. The sample size is 7 for the control no-communication treatment and 10 for the communication treatment. The smallest p value is 0.46, and we reject that communication encourages self-interested recommendations.

			Control – No Communication		Treatment Communication		Difference Com-Cont		Increases Self-Interest		
			A	B	A	B	A	B	A	A	B
#	$10	$5	Fract.	Fract.	Fract.	Fract.	Advice	Chose	t-test	Dec	t-test
i	Certain	Certain	0.71	0.57	0.80	0.80	0.09	0.23	0.648	0.352	0.830
ii	Risky	Certain	0.43	0.57	0.40	0.30	-0.03	-0.27	0.457	0.543	0.146
iii	Certain	Risky	0.29	0.57	0.80	0.80	0.51	0.23	0.983	0.017	0.830
iv	Dominates	Risky	0.57	0.29	0.80	0.70	0.23	0.41	0.830	0.170	0.948
v	Risky	$30 Up	0.86	0.86	1.00	0.50	0.14	-0.36	0.878	0.122	0.073
vi	$0 Down	Risky	0.14	0.29	0.40	0.50	0.26	0.21	0.860	0.140	0.796

Table 15 Hypothesis 5 – one-sided t-test communication increases self-interested behavior.

The table shows the data and tests of significance. Fraction [Fract.] in A is the fraction of time the experts recommend the high $10 choice. Fraction in B is the fraction of time the clients' choice resulted in the high $10 payoff.
The two Difference columns show the change in fraction attributable to communication calculated as Communication - Control [denoted as Com – Cont].
The A t-test shows the one-sided student t-test statistics that the communication treatment increases self-interested recommendations. The A Dec shows the converse, the one-sided student t-test statistics that the communication treatment decreases self-interested recommendations. The B t-test show the one-sided student t-test statistics that the communication treatment increases self-interested (to the expert) choice outcomes.

Because some of the literature reports that communication and transparency improve the outcome of transactions, we will test the converse of Hypothesis 5 that recommendations will improve with communication (see the A Decrease [Dec] column in *Table 15*). Indeed, in the risk-loving task iii) communication does significantly decrease self-interested recommendations (p value of 0.017). In the risky dominated task iv), the $30 upside task v), and the $0 Downside task vi), communications tend toward decreasing self-interested behavior, but none are significant on their own.

This conclusion might be premature, when we examine the outcomes for the client, the results are mixed, sometimes the outcomes are more other-regarding and other times the outcomes are self-interested, also included in *Table 15*. Although not statistically significant, several task choice outcomes trend towards increases in self-interested outcomes; both task ii) risk-averse and task v) $30 upside move towards self-interested outcomes. On the other hand, several outcomes move towards other-regarding outcomes: i) certain, iii) risk-loving, and iv) risky dominated are not significant but are moving in favor of the client.

Finally, we rearrange the data into combinations of the various tasks and will present: the total of all tasks, the risk-averse tasks, the risk-loving task, the risky tasks, the risk-dominated tasks, the low-risk task, and the highly-skewed upside and downside potential task. As before, we reject the hypothesis that communication facilitates an increase in self-interested recommendations. The total of all tasks shows that communication leads to a statistically significant increase in other-regarding recommendations but only a statistically insignificant and small increase in other-regarding choice outcomes. As task iii) with risk loving $10 certain versus a risky $5 produces the largest increase in other-regarding behavior, the slices of data that include task iii) yield more significance than the other groupings. In addition to the total bucket, the risk-loving bucket of task iii) and task v) as well as the risky bucket with tasks ii), iii), v) and vi) also show statistical significance, see *Table 16*.

		Control – No Communication		Treatment Communication		Difference Com-Cont		Increase Other-Regarding		
		A	B	A	B	A	B	A	A	B
$10	$5	Fract.	Fract.	Fract.	Fract.	Advice	Chose	t-test	Dec	t-test
All	1 - 6	0.50	0.52	0.70	0.60	0.62	0.57	0.979	0.021	0.775
Risk-averse	2 & 6	0.29	0.43	0.40	0.40	0.35	0.41	0.746	0.254	0.436
Risk Loving	3 & 5	0.57	0.71	0.90	0.65	0.76	0.68	0.987	0.013	0.352
Risky	2 3 5 6	0.43	0.57	0.65	0.53	0.56	0.54	0.973	0.027	0.321
Dominated	1 & 4	0.64	0.43	0.80	0.75	0.74	0.62	0.839	0.161	0.970
Risky 2 & 3	2 & 3	0.36	0.57	0.60	0.55	0.50	0.56	0.913	0.087	0.453
Up 5 & Down 6	5 & 6	0.50	0.57	0.70	0.50	0.62	0.53	0.875	0.125	0.346

Table 16 Hypothesis 5 – Grouping tasks – communication increases self-interested behavior.

The table shows the data and tests of significance. Fraction [Fract.] in A is the fraction of time the experts recommend the high $10 choice. Fraction in B is the fraction of time the clients' choice resulted in the high $10 payoff.
The two Difference columns show the change in fraction attributable to communication calculated as Communication - Control [denoted as Com – Cont].
The A t-test shows the one-sided student t-test statistics that the communication treatment increases self-interested recommendations. The A Dec shows the converse, the one-sided student t-test statistics that the communication treatment decreases self-interested recommendations. The B t-test shows the one-sided student t-test statistics that the communication treatment increases self-interested choice outcomes.

As Hypothesis 5 failed, it does not make sense to test Hypothesis 6 that communication will have less self-interested effect on the recommendations of the dominated tasks, the certain task i) and risky dominated task iv). We can note along those lines that communication causes the outcome choice for these two dominated tasks to be significantly more other-regarding (p value 0.030). To the extent that this is less self-interested effect from the recommendation and text communication, the spirit of this Hypothesis is there, even if we need to reject it.

Although both Hypotheses 4 and 5 fail, there is some interesting behavior to observe in the communication treatment of task v) with $30 upside potential. When task v) with communication is compared either to the same task without communication or to the risk loving task iii) with communication, the recommendations move in one direction and the outcome choices move in the opposite direction. If this observation holds up under scrutiny with a larger sample size, something quite interesting might be occurring.

The communication of the lottery situation in task v) was complex and most experts tried in their communication in some way to convey the essence of this complex lottery having a large chance of $30 upside but with low expected return of $5. However, half of the experts failed to convince their clients. It is not clear if the complexity of explaining the payout in task v) caused the experts to have difficulty convincing their clients, or if the experts took advantage of this complexity to confuse their clients into not believing the advice. It is possible that communication was used to preserve the propriety of recommending the other-regarding choice while effecting a more self-interested outcome.

Hypothesis 4 posited that compared to risky task ii) and iii), the experts would hide the impropriety of more self-interested recommendation behind the complexity in tasks v) and vi) and gain a more self-interested outcome. But in the case of task v) with communication, it looks like experts may have been able to gain a more self-interested outcome while making other-regarding recommendations and truthful but confusing communications. The experts obtained this more self-interested outcome as we had proposed, but they did this without any personal cost of risk to their propriety. They made no self-interested recommendations!

Similarly, when considering this same task v) under Hypothesis 5 where we postulated that communication might be used to make self-interested recommendations, the recommendations moved in the direction contrary to Hypothesis 5. But half the clients made a choice opposite to the other-regarding recommendation, and the outcomes were in line with Hypothesis 5. It is possible that in some situations, the expert takes advantage of the situation to recommend the other-regarding choice but communicates this recommendation in a less than persuasive manner. The client gets confused, or becomes distrustful, and makes a choice opposite to that recommended. Now the expert has higher "utility," as they were able to preserve their moral integrity by giving the other-regarding recommendation with a truthful communication about the choice. Yet, they did so in a way that resulted in the client rejecting the recommendation and selecting the expert's self-interested choice, as though they had in effect done what Hypothesis 5 proposed and made the self-interested recommendation. In some of the scenarios, the results support such a speculative narrative. But it would be hard to show such intent of confusion. Until more data can be collected such notions remain speculative.

Probably the biggest takeaway from this treatment is that a consistent recommendation with communication of the other-regarding choice was not sufficient to improve the outcome for the clients. The client choices and the client outcomes deteriorated!

With regard to our six hypotheses, only the universally accepted Hypothesis 1, that some experts under non probabilistic certain payments would make other-regarding recommendations, was confirmed. The other hypotheses specific to this experiment had mixed results. With a larger data set some tasks may exhibit the behaviors described in the hypotheses while other tasks may not. There was a lot of heterogeneous behavior, and the behavior in the paired risk-averse and risk-loving tasks may be different from each other. The experiment lacks enough data to observe or test the portion of the experiment design with paired task to identify experts who made self-interested recommendation that are contrary to consistent expectations about the client's utility preferences. But the limited data on hand does little to confirm such behavior. Instead, the observations seem to be that experts behave differently when considering making recommendations about risk-averse or risk-loving situations.

1.7 Conclusion

We wanted to eexpand the literature on when experts switch from other-regarding behavior to self-interested behavior. Our experiment tests if communication from the expert to the client influences the expert's behavior. The literature having observed expert switching to self-interested actions under a plethora of mechanisms that only partially remove direct culpability for the result, it seemed likely that experts would also use communication to further their self-interested ends. This is a novel experimental in the other-regarding literature testing the effects of communication. Compared to the dictator game, communication seems to be natural component of the expert-advice client-choice game; so, this experiment was designed around expert advice. The literature on dictator games is very robust compared to the relatively smaller literature on expert advice in laboratory experiments. As communication had not been tested before, and further as the distinct vocabulary used to describe various situations may result in different behavioral responses, this experiment was designed trying to span a large spectrum of situations to test if the diverse vocabulary or situations mattered. The results were varied across the different task tested, though in many cases the responses were not necessarily what was expected. The level of other-regarding recommendations was either flat or increased with the treatments of communications. Thus, the central Hypothesis 5 that communication would increase self-interested behavior was rejected; in some cases the opposite was statistically significant.

Unfortunately, the circumstance of the ongoing COVID pandemic has made data collection unusually challenging. Most of the Hypotheses specific to our experimental design concerning risky outcomes as well as the effect of communication were inconclusive. Even so, there were sufficient data to confirm Hypothesis 1, the well-established other-regarding recommendation behavior of experts when outcomes are clear.

In the case of task v) with $30 upside, the experts unanimously recommended the other-regarding option yet the communication as so unpersuasive that half the clients not follow their advice. It is not clear if the choices in the task were simply too complicated to explain, or if the communicated explanations of the other-regarding advice were meant to tempt and confuse. Task vi) $0 downside task had a similar 50% following the advice and 50% rejecting the advice, but only 40% of the recommendations were other-regarding. So, in task vi) bad advice was rejected. With a small sample size it would not be possible to evaluate if the actual mostly truthful communications were designed to elicit mistrust, but one should consider the possibility of this strategy when evaluating whether communication was helpful in the case where it elicited 100% other-regarding recommendations. If we only evaluate the effect of communication on the recommendation, then we would fail to consider the real effect of communication on the actual welfare of the outcome chosen. It is indeed novel to entertain that other-regarding recommendations with truthful communication might be contrary to the interest of the client. Additionally, with a larger data set text analysis might be fruitful in illuminating different communication type and how they were used in the various situations.

For the most part, results under Hypotheses 2-6 were at best mixed or in many cases exhibited behavior contrary to the original hypotheses. This mostly statistically insignificant evidence often suggested heterogeneous behavior under the different tasks. The data are at best suggestive that additional data might reject this paper’s six hypotheses. The conclusions might be that recommendation behavior is very specific to the outcome risk profile in each task.

The tasks in this experiment were specifically designed to identify if experts might consistently make self-interested recommendations in risk-averse and risk-loving situations. If the experts would fail to maintain a consistent expectation about the utility risk preferences of clients. Although there are not enough data for statistical analysis on the data parsed into such specific behaviors, the heterogeneity of the data does not indicate that a very significant portion of the population would be expected to exhibit this specific strong self-interested behavior.

On the contrary, the limited data indicate that experts may make very different recommendations when the situation is risk-averse versus risk-loving. The two sets of paired tasks ii) and iii) with risky versus certain outcomes, and v) and iv) where potential risky upside and downside (i.e., more risky outcomes) resulted in nonuniform recommendation and choice outcomes. Probably hypotheses that distinguish the behaviors in these paired tasks are more likely to be significant. The experiment rejects that experts are unambiguously self-interested when risky return is involved.

Instead, the results suggest that experts differ their behavior between the various risk distributions in the tasks, though a larger sample size would be needed to test the specifics. The risk-averse tasks tend to see more self-interested behavior than the risk-loving tasks. But it is unlikely that any significant portion of the client population would actually have such extreme utility risk profiles that they would prefer the $5 choice under any of these outcomes. The experts may be using these unlikely assumptions as a ruse to feel personally more comfortable about making the self-interested wiggle. The experts would be very misguided if they were in good faith assumed their clients' utility risk preferences were so extreme. This is not a genuine assumption; this really could only be used to provide personal comfort through having a vaguely plausible excuse to wiggle and to make the self-interested recommendation. It is interesting to note that in the risk loving case, experts avoid using the excuse of uncertainty to switch to the self-interested advice. This distinction between risk-loving and risk-averse behavior was not one of our hypotheses, thus in this small dataset we did not test it, but future experiments might consider testing such a hypothesis.

In the case of recommendations without communication there is no way for the client to know in what tasks they should believe or distrust the advice. The best indicator of any shift in outcomes would be a shift in recommendations, and with a larger dataset choices should track in the direction of recommendations. This experiment was designed to test theories about expert recommendations. and not specifically to test client choice. With a larger dataset it might be possible to construct a model of the strategies followed by clients, in the without communication treatment this model would have to be constant across all 6 tasks. Some clients would follow the advice while others would do the opposite and a third group would follow some mixed strategy based on cheap-talk. Any model of this would inherently have to track the direction of shift in expert advice. Thus, it is appropriate that our experiment was designed to focus on expert advice.

On the other hand, in the case of communication, the clients may be able to use the communications to discern trustworthy and untrustworthy recommendations. The actual choice behavior in the communications treatments may have some relevance in a larger sample size. At a minimum one should be hesitant to make strong conclusions were advice and choices under communication to diverges in a larger sample.

It may be premature to make any conclusions from this small a data set, but the data do lean towards considering and testing new hypotheses that behavior might be responding to the specific payment probability risk profile of each task. The data are strongly suggestive that a larger dataset will reject that communication increases self-interested advice and may well find that in many situations communication increases other-regarding advice.

CHAPTER 2

Expert Wiggle Room Under Ambiguity versus Uncertainty

When faced with a decision that affects the welfare of another, will a person make more self-interested choices in ambiguous rather than uncertain situations as they can deliberately focus their attention on the beliefs that support a self-interested action rather than considering the full range of possible beliefs within the ambiguous information?

2.1 Abstract

Knowledgeable experts make decisions on behalf of uninformed clients even if their knowledge might be incomplete. Knowing treatment effectiveness from a medical study, a physician's decision is made under uncertainty. Alternatively, not knowing treatment effectiveness, the physician's decision is made under ambiguity. In situations where the experts' and clients' interests are not aligned, the expert choice is between self-interested and other-regarding options. With ambiguous knowledge, the expert will make their decision based on the range of possible situations. However, they might select to focus on the situations that justify self-serving decisions even if the majority of the possible situations support an other-regarding choice that is not favorable for themselves. In other dictator games experts are observed to take advantage of any elements that might decouple their actions from direct culpability for the other's outcome, to make more self-interested choices. The question we examine with controlled laboratory experiment dictator games is whether the choices made by experts under ambiguity

are more self-interested than those made under uncertainty? Our results find behavior under ambiguity and uncertainty indistinguishable.

2.2 Introduction and Motivation –Physicians and other examples of expert decisions

If faced with a decision that affects the welfare of another, will a person make more self-interested choices in ambiguous[6] rather than uncertain[7] situations? The decision maker in the ambiguous situations may be able to select to focus their attention only on the potential states of the situation under the ambiguity that support their self-interested action rather than considering the full range of possible beliefs within the ambiguous information that might in total support a different other-regarding action that does not align with their own self-interests.

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[6] We are using the Ellsberg definition of ambiguity. An ambiguous decision or choice results in a state where the probabilities of the outcomes are unknown. Ambiguity is present "where there are questions of reliability and relevance of information, and particularly where there is conflicting opinion" and thus judgement information and estimates "cannot be expressed in terms of relative likelihoods or events (if it could, it would simply affect the final, compound probabilities)." (Ellsberg, 1961 [17]) Thus we are excluding Camerer and Weber's, 1992 [8], Second-Order Probabilities, where all probabilities are known but are represented by two nested stages, the first stage being the probabilities of each probability distribution being the current or correct state, and the second stage being the probability distributions. This definition is consistent with Knight's, 1921 [36], definition of unmeasurable uncertainty where "numerical probabilities were inapplicable - in situations when the decision-maker was ignorant of the statistical frequencies of events relevant to his decision; or when a priori calculations were impossible"; nested probabilities are excluded when all the probability information is known and thus it is possible to calculate the probabilities. This ambiguity is similar to Keynes's, 1921 [35], unknown probabilities, whatever the cause of the probabilities not being known.

[7] For events with known or calculable probabilities, risk, or odds, we are using the umbrella term uncertainty. This appears to be consistent with the formal use in the current experimental economics literature (Salmon and Shniderman, 2019 [59]), though informal usage varies substantially from this definition. Historically a long list of labels has been attached to this well-defined concept of "Bayesian" Subjective Utility and probabilistic knowledge of the situation where Savage's Axioms would be applicable. In particular Knight would call this "risk", or "measurable uncertainty" and Ellsberg call it "unambiguous" gambles/risk/probabilities/likelihood.

In situations where we are not knowledgeable, we have all sought and relied on the advice of experts. If we need medical care we go to our physician, if we need investment advice, we ask a stockbroker, if we need our plumbing, air-conditioning, electricity, or car repaired, we seek the advice of a service provider skilled in those repairs. Even owners of corporations use company managers to make diverse frequent daily management decisions, and citizens allocate running the country to expert government officials to make those decisions. Every new technological advance in our economy sprouts new fields of experts to manufacture, use, and service these innovations. There are innumerable daily situations where decisions are made by expert service providers on behalf of uninformed clients.

We are using the Ellsberg definition of ambiguity of a state where the probabilities of the outcomes are unknown, Ellsberg, 1961 [17]. We exclude nested probabilities and second-order probabilities from our consideration of ambiguity; thus, we exclude Camerer and Weber's, 1992 [8], second-order probabilities. Although they use different terminology, this definition is consistent with Knight's, 1921 [36], unmeasurable uncertainty and Keynes's, 1921 [35], unknown probabilities. See footnote 6 for further discussion.

Even though there is a trust in experts, there is also a fear that the expert may take advantage of the uninformed client. Did the mechanic or plumber really replace that part, or did they just charge me for that part after doing a simpler repair? Could my air-conditioner have been repaired or did the repair person make more money from installing a new air-conditioning unit? We have all heard a litany of these doubts.

One specific example that has been carefully measured is physicians making the decision between natural delivery and cesarean section. Physicians are observed to make self-interested decisions that increase their own income at the expense of the wellbeing of the patient. The majority of cesarian sections performed in the US are not medically necessary. Presumably, physicians make this choice as a cesarian section generally pays the physician and hospital about twice as much as natural delivery. However, when unnecessary, C-sections slightly increase the risks of complication or even death to mother and child. Further studies have shown that there is the negative elasticity response to the comparable cost of cesarians and natural delivery. The primary explanation of this negative elasticity to price is that the decision may be more about the physician's income than the health and welfare of the mother and baby.[8]

This paper studies the difference in the behavioral choices of the decision maker when they have different types of information available to them about the choice they are making for their client. We compare decisions made with uncertain information with decision made with ambiguous information.

In well-documented but uncertain situations, the experts will know the probabilities of the outcomes based on their decision choices. An example of this would be when a doctor has a

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[8] C-sections: Measuring the effectiveness of decisions within the actual health care process can be quite complex or even impossible. Thus, we will be using a laboratory experiment. There is one medical procedure that does lend itself well to investigation. It illustrates that the doctor's self-interested decision is contributing to cost significantly, indicating that our behavioral experiment may be looking at the right type of decision to help reduce excessive Health Care costs.

Given variation in demographic characteristic, it is expected that the medical lifesaving need for C-sections in any population is between 10% and 15%, thus C-section rates above 15% can generally be considered unnecessary. The 2010 C-section rate in the United States varied from 7% to 70% by hospital, averaging 33%. Physician compensation for C-sections is significantly higher than for natural births. Not only are physicians performing unnecessary C-sections, but C-sections also show a positive price elasticity of demand. The locations with greater additional compensation to the doctor for a C-sections are the same locations with higher C-section rates. This observation could be driven by the same behaviors we are investigating, whenever the physician sees any uncertain or ambiguous signs such as a small anomaly, they are using this anomaly to provide moral cover so they can choose to perform a C-section even if it is not accurately necessary or in the client's best interest. Gruber and Owings, 1996 [28].

medical study comparing the relevant treatment outcomes for patients with similar conditions to their own patient. The doctor could use the study's results to choose for their patient the treatment that had the highest chance of successful outcomes, even if no outcome were certain.

In less well-documented situations, the expert may only have some vague ambiguous understanding of the range of probabilities that might be applicable to the various outcomes given their choices. In such situations, the doctor might have no studies directly applicable to their patient or might have multiple studies with conflicting information as far as what the best treatment might be. In making the decision for their patient, the doctor would be making a judgement call about what possible information from a range of possibilities might be most relevant for this patient and their condition. It might be appropriate to use the treatment recommended by the largest number of studies, or it might be appropriate to think that the one outlying study with a different answer was more relevant for this situation. It is a judgement call, neither answer is wrong, although it may be that most experts would expect the "average" or middle answer to have more support. What we trying to examine is whether this judgement call used in the decision process is inordinately focusing on the judgement that would most benefit the decision maker's outcome as a means to justify this self-interested choice, rather than focusing on all the possibilities in an effort to find the choice that will benefit the client's outcome.

First, as observed throughout the literature in other similar experiments, we hypothesize that we will observe experts making some other-regarding decisions where they do not choose the self-interested choice. Second, the primary hypothesis we are testing is that decision makers faced with ambiguity will make more self-interested choices than decision makers faced with uncertain information. In both situations, the outcome is unknown; however, in ambiguous situations there is no way to identify a single “correct” choice with the highest expected client utility. We hypothesize that decision makers will take advantage of this ambiguous opportunity by focusing their attention on the possible information that results in justifying a self-interested choice even if this possible information might be viewed as having less support. Thus, we expect to observe more self-interested choices under ambiguity compared to more other-regarding choices for decisions with uncertainty.

In the filed many of the decisions on behalf of others are made under ambiguity or uncertainty. But in many of these ambiguous cases it might be possible to educate the expert about existing knowledge or for more detailed research and studies to be performed thus turning the expert advice under ambiguity into expert advice under uncertainty. Thus, with an investment in education, a study or research, similar future decisions could be made with known probabilities of outcomes and only face uncertainty but not ambiguity. With public policy and intervention through investment in studies, it might be possible to improve some expert decision-making process so that the outcomes for their clients have a higher expected utility. Likewise, it would also be possible for the decision maker to change an uncertain situation into ambiguous decisions through deliberate ignorance (either as a beneficial policy if that was warranted or to serve self-interest). As studying such decisions will have public policy implications across many fields, a deeper understanding of the influences on the decision made on behalf of other is important.

The difference between ambiguity and uncertainty is the extent of knowledge about the probabilities of each outcome were that option selected; thus, in an experiment carefully changing only one step at a time, it becomes natural to compare these two states in an attempt to isolate what causes transitions between other-regarding and self-interested behavior.

2.3 Literature Review

This paper examines the choice behavior of decision makers whose choices affect the welfare of others. As is the case with much of the other-regarding literature we utilize laboratory experiments with variations of the dictator game[9]. We examine a range of other-regarding choices made where the outcomes are uncertain in that they are defined by probability, compared to choices made where there is ambiguity about the outcome as there is only a range of possible probabilities for the outcomes. Although historically these precise labels are not always used in the literature, there have been multiple variations in the literature that test conditions of uncertainty and a few that test ambiguity. These studies have observed both self-interested and other-regarding choices in both situations with ambiguity and with uncertainty.[10] We did not find any papers that compared ambiguity and certainty directly, although Haisley and Weber, 2010 [29], comes close. We will examine a few of these examples below.

In designing our experiment, we modified the three-color Ellsberg Urn game to be an other-regarding decision, Ellsberg, 1961 [17]. Previous three-color Ellsberg Urn game experiments have observed ambiguity aversion when decisions were made in situations where only their own outcomes were affected. In our discussion, we will also review the Ellsberg Urn

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[9] Throughout we use the terms dictator and dictator game to connote the role of the decision maker in the classic psychology and economic dictator game used to test norms of fairness, propriety and the fickle fleeting nature of other-regarding preferences that challenge more classical assumptions of self-interest and maximization of personal profits. The dictator is given an endowment of money to split between the dictator and the other passive participant, the recipient. Sometimes dictator-experimental-subjects give some of the money to the recipient, but less or more so in different variation of the game. The specific contextual framing and setup of this dictator game has been found to influence the dictator's decisions significantly, and this has led to the use of dictator games to study and try to isolate specific psychological-economic causes that influence individuals to be more other-regarding or more self-interested.

[10] Dana et al., 2007 [16]; Haisley and Weber, 2010 [29]; van der Weele Kulisa Kosfeld and Friebel, 2010 [60]; Krawczyk and Le Lec, 2008 [38]; Karni Salmon & Sopher, 2008 [34].

literature as it relates to our test that examines whether decision makers take advantage of the wiggle room from ambiguity to focus more on the possibilities that justify self-interested decisions.

Dictator games provide a classical laboratory experimental game where the decisions made by subjects exhibit other-regarding preferences and people are clearly not just making decisions to maximize their own wealth. Utilizing various treatments and other variations, the literature has used dictator games to study people's preferences concerning others.

Two of the early papers to start untangling the motives behind the observed other-regarding preference in the dictator game were Dana Cain Dawes (Dana et al., 2006) [15] and Dana Weber and Kuang (Dana et al., 2007) [16]. They investigated several treatment variations of the dictator game and were able to observe differences in choices in the dictator game by changing small aspects framing the choice but keeping core choice about how much to share. The baseline dictator game, where all parties have full knowledge and the outcomes are deterministic (not probabilistic) based on the dictator's actions, resulted in about 75% other-regarding choices. Whereas in various uncertain framings that obscured direct culpability this opacity provided moral "wiggle room" for almost half of these subjects, who were other-regarding under transparency, to become self-interested. The dictator game was creating a situation where many subjects felt situationally obliged to share; thereby they frequently exhibited other-regarding or sharing behavior. However, if the dictator's actions could be construed as not directly causing the bad results for the other subject, then the dictators felt much less obligation to make other-regarding choices. Subjects even avoided costless effort that would have allowed them to make other-regarding choices efficiently; dictators avoided learning which option was the other-regarding choice and instead through elected ignorance chose the self-interested option.[11] .

Dictator game experiments have continued to build on these discoveries, investigating how the dictator's other-regarding actions were sensitive to variations in the framing. Below is a summary of some of the literature focused on various treatments that caused subjects to switch between giving more frequently in one situational frame to choosing more self-interest actions in a different frame. Experiments by a multitude of authors used a wide variety of wiggle room mechanisms. This switching was evident in frames that utilized ambiguity, uncertainty, ignorance, delegation, exit, and expanded choice sets among others when the situation changed to allow for or exclude possible wiggle room beliefs that could preserve the appearance that the decision markers choices-maintained propriety and did not violate consideration of other-regarding concern. Following is a review of some of this literature concentrating on variation of ambiguity and uncertainty even when these terms were not explicitly used.

Although some papers use the term ambiguity loosely there are no papers we could find where the device used in the dictator game conforms specifically to our formal Ellsberg-Knight definition of ambiguity as an unknown probability or range of probabilities (or incalculable probability) where through the design of the experiment the subjects in the experiment are not informed about the probabilities or distribution of probabilities inherent to the devices design. We did find several situations where decisions were delegated or shared with another human; although the behavior of the other human was "unknown", it is more likely that such human interactions are best viewed as a strategic solution to a game-theory problem rather than as an unknown ambiguous device.

[11] Dana et al., 2007 [16]; Grossman, 2014 [26]; Grossman and van der Weele, 2015 [27].

The paper that comes closest to examining ambiguity is Haisley and Weber, 2010 [29], where they compared uncertainty to a treatment labeled "ambiguity". The uncertain treatment has a 50% probability of paying the recipient when the dictator chose the self-interested option; the other-regarding choice is deterministic paying 100% of the time. The "ambiguity" treatment is a double lottery first randomly drawing the probability, then drawing the outcome – there is still a 50% chance of payment. The dictator makes fewer other-regarding choices in the "ambiguity" double lottery treatment than in the uncertain less complex single lottery. However, the "ambiguity" treatment does not meet the Ellsberg-Knight definition of ambiguity since the treatment in is a second-order probability – a double lottery – a more complex but still computable probabilistic outcome with the same payoff.[12] It is still easy to calculate all probabilities and thus in both the uncertain and double uncertain treatments the dictator would have no ambiguity about the expectation of the value of the recipient's benefits. There is no ambiguity about the belief the dictator should hold about the expectation of the payments for the recipient.[13]

[12] See Footnotes 6 and 7 for the Ellsberg-Knight definitions used in this paper for ambiguity and uncertainty.

[13] Haisley and Weber, 2010 [29]. In the treatment labeled "ambiguity" the first lottery with equal probabilities of drawing a number between 0 and 20 for the number of red chips, the remainder of the 20 chips being blue; the second lottery is an equal-probability draw from the bag of 20 chips to see if the draw matches the color chosen by the dictator. The resulting 50% chance of payment does not meet our definition of ambiguity.

Another problem with Haisley and Weber, 2010 [29], is that it fails to control the game design symmetrically in that the self-interested choice is always the same choice as the lottery and double lottery. Thus, if there is a preference for lotteries or for double lotteries this is indistinguishable from a self-interested preference. The experiment also includes a treatment with "education" about double lotteries. The observed response to this education treatment is indistinguishable between education that changed the dictator's preference for double lotteries versus education that changed use of wiggle room and other-regarding preference. There would need to be a symmetrical game that switches the alignment of the self-interested and other-regarding choices so that the self-interested choice is separated from the lottery and double lottery. This would facilitate distinguishing between actions facilitated by wiggle room being used to increase self-interested choices preferences from action motivated by preference about lotteries and double lotteries.

They are able to ameliorate some of this double lottery wiggle by having the subject play a self-interested single (uncertain) or double ("ambiguous") probability-uncertainty lottery prior to playing the dictator game. The subsequent dictator game shows reduced self-interested wiggle in situations with similar double uncertainty ("ambiguous") payment to others. These treated double-lottery games are indistinguishable from the single uncertainty payments to others with or without the treatment of the self-interested game.

There are two papers where the decision is delegated to another human, thus resulting in outcomes of unknown probability, but these other humans should probably be viewed as a strategic solution removing culpability. Dana et al., 2007 [16] uses the ambiguity of a second human in a multiple-dictator treatment where only when both chose the self-interested option is that payout implemented, otherwise the other-regarding outcome is paid. The frequency of the self-interested choices when made by the other human is between the frequency of the two-uncertainty treatment; however, as the treatments are not designed to be similar to each other, this might be an artifact of the different framing. The other paper Bartling and Fischbacher, 2012 [4], focuses on blame and punishment; some treatments without punishment used the delegation to another human as an ambiguous device motivated by the other human's unknown behavior. It seems that to avoid a perceived obligation to make the other-regarding choice, some dictators instead delegate to this second human thereby increasing the chance of a self-interested results.

Uncertain outcomes have known probabilities of occurring, and the outcome is determined by a computer, coin, or other probability device. The dictators have a direct choice to invoke a probability mechanism, or an indirect way such as by choosing to act slowly. The outcome is a state with known probabilities of each different outcome. Dana et al., 2007 [16], has an uncertain treatment where slow action results in a random choice by the computer. Some subjects are still other-regarding even though many used the information veil of social deniability to make self-interested choices directly. The central treatment is that through inaction, a probability device will make some self-interested choice without the dictator suffering a blow to their own self-image as they do not need to make the selfish choice directly. This treatment results in more other-regarding behavior than the ambiguous shared-with-another-human decision, but it is probably not significant, nor are the game decision trees or actions very comparable.

Similar to the slow choice in Dana et al., 2007 [16], van der Weele Kulisa Kosfeld and Friebel, 2010 [60] played reciprocity games with a slow choice action resulting in random choice treatment. They "conclude that reciprocity is a more stable disposition than dictator game generosity" as there is no discernable reciprocity wiggle. The social interaction of giving combined with the option for reciprocity to return the favor by giving back has created a social expectation that is not disrupted by the option to blame the computer's choice for failing to be reciprocal.

The two other papers with uncertainty are Haisley and Weber, 2010 [29], as discussed above that includes both uncertainty and double uncertainty and Krawczyk and Le Lec, 2008 [38]. The latter places subjects in two probabilistic-uncertain treatments with the allocation of 10 tokens between self and other where subjects are sometimes other-regarding.

Uncertainty through strategic ignorance and hidden information is used in assorted settings to preserve an uncertain situation where there are defined probabilities for various outcomes or states; whereas a costless action could be taken prior to making the decision that would reveal the actual conditions and thus remove the uncertainty. In Dana et al., 2007 [16] however, some participants avoid costless action to become informed and use ignorance wiggle to make self-interested action, and some participants make other-regarding choices. Grossman, 2014 [26], modifies this hidden-information treatment to test treatments with 1) a hidden-information default 2) active choice required 3) reveal default. All treatments exhibit other-regarding action with active choice and default reveal having significantly more other-regarding behavior than hidden default. Actions required or not required to maintain uncertainty under strategic ignorance matter. Larson and Capra, 2009 [41], run double blind experiments building on Dana et al., 2007 [16], hidden uncertain-information experiments, some dictators based on their own moral self-image still take other-regarding actions.

In Feiler, 2014 [18], ignorance maintains uncertainty with varying degrees of aligned and misaligned interests; some participants are other-regarding, other participant's use ignorance for wiggle to self-interested action, where distribution of choices varies by conditions. Matthey and Regner, 2011 [43], use additional payment rewards and probabilities in the hidden uncertain-information dictator game, and some subjects continue to take other-regarding actions.

Grossman and van der Weele, 2015 [27], use uncertain hidden-information dictator games where some subjects in each variant will take other-regarding actions, revealing the state of the game to select the other-regarding choice. These subjects also exhibit more pro-social scores on the experiment's behavioral test. Meanwhile, other subjects opt to be informed only after making their self-interested decision under uncertainty. Further, some are even willing to pay for ignorance and the preservation of uncertainty, so they do not feel compelled to make the other-regarding choice.

Models of behavior and experiments in both the psychology of lying and the economics of lying describe three exhibited behaviors a) Truthful, b) Profit Maximizing – full lying, and c) Strategic Lying to increase profit but in a way that maintains some veil of respectability and morals in the opinions of both self and other. Both wiggle room and strategic lying benefit from added self-serving action while maintaining some appearance of respectability in that the decision maker is able to point out that they did not take the worst choice – being that a self-interested choice or a full lie. It should be noted that these lying and dictator game experiments while looking for strategic lying and wiggle room also continue to observe some subjects who are truthful-generous and some who are untruthful-profit-maximizing. There are similar "acceptable" but constrained moral lapses in obscured-causality wiggle room and in the dishonesty-lying of partial lies where for limited gains subjects make small stretches of the truth. Subjects will avoid full lies for maximum gain as they avoid violating propriety, but partial lies seem tolerable. Slightly stretching the truth appears acceptable as it is taking advantage of opaque or indirect culpability wiggle room.[14]

Even though we are testing a completely different behavior, we must also attribute inspiration for our experiment's ambiguity design to an Ellsberg Urn design previously used to show the Ellsberg paradox of ambiguity aversion, Ellsberg, 1961 [17]. We utilized the urn design to model both probability and ambiguity. The Ellsberg paradox examines and finds ambiguity aversion in games with one player.[15] Although we utilize a similar ambiguity design of drawing-colored balls from an urn in our experiment, the hypothesis we test is that ambiguity is utilized to make self-interested choices when ambiguity obscures culpability. Our experiment is designed so that ambiguity aversion can be distinguished from self-interested actions. In some treatments the self-interested choices have ambiguous payments to the other, in other treatments the other-

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[14] Mazar et al., 2008 [44] show in six experiments designed to test mechanisms that increase morals in a task that often-induced partial lies where self-reported numbers of correctly completed task were slightly exaggerated but participants were not claiming the full lie of all tasks completed correctly. Reminding participants of morality or signing an honor code reduced partial lie cheating. Participants knew they were lying as they were able to accurately predict their performance on a no-cheating task after having just reported higher results on the same task where cheating was possible. This small-exaggeration lying did not change when told the average performance was much higher than the subject own performance, nor did the level of cheating respond to changes in monitoring levels that varied the chance of being caught. There was a slightly higher level of cheating when the process was more complex or indirect – when participants were first paid in chips rather than directly in cash, and then exchanged the chips for cash.

[15] It is possible that our experiment is one of the first to be able to observe other-regarding ambiguity aversion, when the decision maker is financially indifferent, although this behavior is not directly related to the elements of wiggle room that are of interest in this study.

regarding choice has ambiguous payments. For a comprehensive review of Ellsberg Urn experiments and ambiguity aversion, see Camerer and Weber, 1992 [8].[16]

Finally, there are innumerable popular jokes and stories exemplifying the good and bad behavior by auto mechanics, plumbers, electricians, stockbrokers, salesclerks, and doctors that could fill several encyclopedias, years of standup routines, and countless personal advice columns The decisions of experts are a concern of popular culture as well as of academic studies motivated to solve concerns that affect outcomes in society. For example, Jacobsen et.al., 2011 [7] explored the other-regarding behavioral traits of nursing students entering the health care profession compared to students studying to become real-estate brokers. Even though our stereotypes of these two professions are quite different, both sets of humans exhibited a distribution across similar behavior types. Nevertheless, in line with our stereotypes, the distribution of other-regarding and self-interested behaviors was different in the two professions. Health care professionals (nursing students) were significantly more generous in the baseline dictator game, but also exited the game with higher frequency. Both groups exhibited this self-interested wiggle exit in different proportion, but still confirmed that generosity is not driven by a welfare-regarding concern but is more a form of social expectation.

Thus, even though health care professionals are exactly the type of expert one would want making decisions for patients, it is also clear that it is important to understand and control the framing of the interactions with the patient so as to preserve as much other-regarding behavior as possible and to avoid framings that result in an increase in self-interested choices.

[16] Fox and Tversky (1995) [21] explore the limitations of ambiguity aversion framing. Ambiguity aversion is displayed as a presence for less ambiguous clearer situation, in isolation without a comparative option the aversion and utility discount of ambiguity disappears.

We need a better understanding of expert other-regarding decisions so that public policy could foster other-regarding expert services.

2.4 Experimental Design

A total of 66 Southern Methodist University undergraduate students from various departments were recruited for an experiment. Each student participated in one of 5 experiment sessions that were run with between 8 and 18 students and lasted about an hour and a half each. Students were seated with privacy screens separating their computer terminals. As the instructions were read out loud, students participated in three practice periods as examples of the computer interface and the format of the questions they would be answering during the session. There were two types of participants: Type A participants would make decisions that affected the outcome for both paired participants, whereas Type B participants would answer questions about the situation that did not affect the outcome.[17] After the practice periods subjects were permanently assigned to one of the two participant types. In the practice periods, subjects answered the questions and saw the screens and the results for both participant types A and B, and thus they were familiar with what the other participant type would see and know in addition to their own screens. In each of the 34 periods Type A and Type B participants were randomly paired for that period and would be randomly paired with other participants in the other periods.[18]

[17] Participant B was paid $5 for answering these questions, this amount is included in the expected payments to participant B in *Figure 1*.

[18] See note 7, the first two sessions had 2 sets of 15 periods for a total of 30 periods, later sessions had 2 sets of 17 periods for a total of 34 periods.

In each period, the Type A participants made a decision involving a virtual bag containing many balls of three different colors. One ball would be randomly drawn from the bag with each ball having equal probability. Before a ball was drawn by the computer, type A participants chose between two of the three colors displayed on their computer screens (they could choose the center or right color but not the left color), which determined payments for the matched pair of dictator and recipient participants in that period. If the color chosen by A matched the randomly drawn ball, then B's payment for that period was 30 Experiment Currency Units [ECUs]; if the colors did not match B received no payment.

There were two different information treatments (uncertain and ambiguous) and within those treatments there were 17 different payment and ball configurations see *Figure 1*.

15 ball model example that can also be scaled to 30 or 45 ball model

Table of payments to decision maker (Participant A) if they chose the Center or Right Ball color

i) More Left Balls

	Left	Center	Right
Example Ball Configuration:			
Number of Balls:	7	3	5
Expected Pay to B:	N/A	$11	**$15**
Scenario #			
1		***$15***	$11
2		***$15***	$12
3		***$15***	$13
4		***$15***	$14
5		*$15*	*$15*
6		$15	***$16***

ii) Equal Probabilities

	Left	Center	Right
Example Ball Configuration:			
Number of Balls:	5	5	5
Expected Pay to B:	N/A	*$15*	*$15*
Scenario #			
7		***$15***	$14
8		*$15*	*$15*
9		$15	***$16***
10		$15	***$17***
11		$15	***$18***

iii) More Center Balls

	Left	Center	Right
Example Ball Configuration:			
Number of Balls:	3	7	5
Expected Pay to B:	N/A	**$19**	$15
Scenario #			
12		***$15***	$14
13		*$15*	*$15*
14		$15	***$16***
15		$15	***$17***
16		$15	***$18***
17		$15	***$19***

Key: ***Self Regarding - A*** *Indifferent: $15 = $15* **Other Regarding - B**

Figure 1 Example of 17 Different Scenarios tested of Bag-Ball-Color-Pay.
The second row gives the expected payments to participant B when participant A choses the center or the right ball color. The columns show the payment options to participant A in each of the 17 scenarios.

The 17 configurations are used to elicit the subject's preferences over a broad range of situations.[19] *Figure 1* shows the configuration with 15 balls; the 30 ball and 45 ball

[19] In the first two experimental sessions, the experiment only asked 15 different question configurations. Some participants did not exhibit strong preferences when incentives were small. Therefore, the later sessions were expanded to include two more questions with larger incentives. Using the scenario numbers in *Figure 1*, some participants did not change their choice between scenarios #7 and #9, thus scenarios #10 and #11 with larger incentives were added so that switching behaviors might be observed. The rest of the text will refer to 17 configurations of questions for both treatments for a total of 34 questions, it being understood that for the first two experimental sessions there were only 15 configurations for both treatments for a total of 30 questions.

configurations are a direct scaling of the 15-ball configuration keeping the color ratios constant so that probabilities for each color remained the same in each of the three scaled variations. To eliminate possible biases for each participant, the order of the questions was randomized, the colors were randomized, and the total number of balls in the configuration of the bag was randomized. The 6 standard primary and secondary colors were used, and in each period the bag contained balls with 3 of these colors.[20]

Figure 1 shows the three types of ball configurations participant A saw in this experiment:

i) More left color balls with 7 left, 3 center and 5 right color balls,

ii) Equal probability with 5 balls of each color, and

iii) More center color balls with 3 left, 7 center and 5 right color balls.

Both type A and type B participants knew and saw on their screen that the right most color is one third of the total balls. Participant A had more, but possibly not complete, information about the number of center and left color balls when making their choice, this information varied from period to period based on the information treatment that was being tested. Even if A knew the exact ball configuration, A would still not know which ball would be randomly drawn. Participant B did not have any other information except the names of the left and center colors. When the participant does not know the exact information about a ball, it was displayed with the ball's two different potential colors, see *Figure 2*. In addition to graphically

[20] *Figure 1* and the other Figures use white grey and black due to printing constraints

displaying the ball configuration in each period there was also a text description of the configuration.

Figure 2 Example of how a ball that could be white or black was displayed

Participant B is the unknowledgeable client. Thus, B would not be able to identify or compare probability or their probability-based preference between the expert's choice of the center or rightward color. In configuration ii) if Participant B were knowledgeable of the ball configuration, they would be indifferent between the choices; both the center and right color choice had an expected payoff of $\$15$ $[5\ balls \div 15\ balls \times \$30 + \$5]$[21]. However, in configuration i) B's preference would be the center choice as the expected payoff was $\$19$ $[7 \div 15 \times \$30 + \$5]$, whereas the rightward color's expected payoff was only $\$15$ $[5 \div 15 \times \$30 + \$5]$. In configuration iii) B's preference would be the rightward color choice as the expected payoff was $\$15$ $[5 \div 15 \times \$30 + \$5]$, whereas the center color's expected payoff was only $\$11$ $[3 \div 15 \times \$30 + \$5]$.

The experiment is designed to test all three ball configurations with a range of payments for participant A. Participant A knew their own potential earnings that were determined solely by the color they choose, independent of the random ball selection and participant B's payment. The

[21] In addition to the potential to have a $30 payoff if the balls matched or $0 if they did not, participant B was paid $5 for answering questions each period that was related to the game play but did not affect the game play. This $5 was included in the calculation of participant B's total expected pay to make it comparable to the decision maker's (participant A) payment for their choice.

center color always paid participant A 15 ECUs, and the rightmost color paid an amount between 11 and 19 ECUs as displayed on their screen. So that behaviors could be observed across different financial inducements, participant A made choices for all types of conditions: a larger payment for choosing the center color, a larger payment for the rightward color, or also indifference when there were two equal inducement choices. When both participants favored the same choice, presumably there would be a tendency to choose this color. In Scenario # 12 in *Figure 1* both participants would benefit more from the center choice. Participant A is paid $15 which is more than $14, and participant B has a 7/15 chance to receive the larger $35 payment which is larger than the rightward choice with 5/15 chance of the larger payment. Thus, in Scenario # 12 the center choice should be the predominant choice.

When a participant's welfare was indifferent between two choices, presumably the other factors of the decision problem would influence their choice. When the two participants' payment interest were diametrically opposed, we tested a range of payment amounts to the participant A in order to test the behavioral strength of participant A's tradeoff between their own interest and the interest of the other participant, participant B. In Scenarios 14-17, the decision of participant A was tested progressively with an additional $1 incentive in each subsequent scenario for choosing the rightward self-interested choice at the expense of the alternative center other-interested choice; the question was how much additional self-interested pay is needed to cause participant A to not pick the center other-interested choice.

In this paper we test two different levels of information available to participant A, the decision maker, when determining their choice for both participants. The uncertain treatment with defined probabilities is where participant A has complete information about the configuration of the balls in the bag. This is similar to an expert practicing their profession fully knowing everything there is to know about the choice being made and the probabilities of success of each alternative.

The ambiguous information treatment configuration is where participant A has ambiguous information about multiple possible states of the problem. Participant A is uncertain about the actual state of the problem as there is a range of possible states that describe the conditions, but there is no knowledge or known probability about which of these states might be the actual configuration of the problem. As probabilities are undefined, they could be skewed in either direction; however, when drawing balls in the ambiguous cases, we use the same probabilities as in the corresponding uncertain cases. This distribution is consistent and indistinguishable from any distribution with the same mean such as any symmetric distribution about the mean (uniform, normal-Gaussian, symmetric triangle, symmetric binomial, etc.).

Under the ambiguity treatment of ball configurations i), ii) and iii), both participants continue to know that there are 5 balls of the right-most color. In the equal configuration ii), participant A knows there are at least 3 balls of the left color and at least 3 balls of the center color, while the remaining 4 balls could be either the left or center color but no further information about these 4 balls is known. In the more left configuration i), participant A knows there are at least 5 balls of the left color and at least 1 ball of the center color, but the remaining 4 balls could be either of those two colors [see the Scenarios 18-21 of *Figure 4* for an example of how this looked on the participant A's screen]. In configuration iii), the state of the left and center colors is the reverse of configuration i) [see the Scenarios 31-34 of *Figure 4* for an example of how this looked on the participant A's screen]. The ambiguous treatment is designed to reduce the direct culpability between participant A's choice and the outcome to participant B. As there is a range of possible bag-ball-color configurations, each possible configuration, were it individually true, might in participant A's reasoning justify different decisions; thus, a range of decisions might be viewed as reasonable. The information could be used by participant A to support a variety of different beliefs about the actual state of the ambiguous problems. All ambiguous cases include 5 possible configuration states; one of the possible states is always the one where participant B's payments could be from the equal treatment where B would be indifferent to the choices made by A. However, given that there are also 4 other possible configuration states, the presumption that B is indifferent may not be a strongly supported belief, as the support for other assumptions is more robust and includes any assumption where any of the four non-indifferent states is given more than zero weight.

The scenarios have been carefully constructed so that we test both combinations: ambiguity combined with self-interested choices configuration i) Scenarios 18-21 of *Figure 4*, and ambiguity combined with other-regarding choices configuration iii) Scenarios 31-34 of *Figure 4*. This enables us to differentiate between behavior that is some preference or avoidance of ambiguity versus behavior that is related to self-interested and other-regarding preferences.

Each period after A's color choice, the computer randomly draws a ball from that period's bag-ball-color configuration, and the results and potential payment are displayed for both paired participants to see. If there was any learning effect from seeing these results, this has been controlled for by having all participants answer the questions in different random orders. After making choices for all 17 payments and ball configurations in both of the two information states for all 34 periods, a single period for all participants was randomly selected to determine everyone's actual final earnings.[22]

[22] See note 5, the first two sessions had 2 sets of 15 periods for a total of 30 periods, later sessions had 2 sets of 17 periods for a total of 34 periods. Note that everyone's order was

After the decision game scenarios, the subjects were given 5 minutes to answer 14 questions designed to test numeracy and cognitive abilities; participants received 50 cents for each correct answer. Subsequently the participants were paid for both activities. The participants received a $10 show-up fee, payment based on their test score, and as described above one of the potential payment periods was randomly selected for payment. The subjects' average total earnings were about $30 for about an hour and a half of participation.

This expert decision game was designed to emulate the general conditions characteristic of knowledgeable experts in the field making decision on behalf of their clients. The experiment as designed focused on events that pay or do not pay such as the successful repair of an object or the curing of a patient, but this model could also be adjusted to study tradeoffs between outcomes with smaller differences. The model further has the feature that the outcomes are determined by random probability, this will be similar to most expert service decisions as few if any such services have 100% success rate. Thus, both in the experiment and in services observed in the field, even when the expert acts in good faith with the best intentions for the client's outcome, sometimes the repair, cure, or stock performance are elusive even for other-regarding experts.

2.5 Theory and Hypotheses

Our paper examines individuals' choices that concern both their own welfare as well as the welfare of another. The central premise is that the decisions made will be more self-interested when the outcome for the other participant are described ambiguously compared to similar decisions made when the other participants outcomes are uncertain. In an ambiguous situation

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different, as they were randomly determined, thus each participant pair in the payment period would likely be paid for different configurations than the other pairs in the payment period.

there are fewer constraints; the expert is able to justify a self-interested choice by ignoring any ambiguous possibilities where the other participant's interests are not aligned with their own. Thus, the expert could maintain a belief that justifies their self-interested decision as also being an other-regarding decision.

As previously explained, the choices we present involve one individual making a choice that has a deterministic impact on their own welfare and a known probabilistic-uncertain or an ambiguous unknown-probability impact on someone else's welfare. In every decision made, participant A can look at the compensation to identify what is in his or her own interest. In a decision involving uncertainty with known probabilities, participant A can also easily calculated the relative expected values of each choice thus identifying the decision that is in the best interest of the other person.

This experiment is designed to measure how much welfare the participants A will give up in order to help the participants B by choosing the option that generates the highest expected value for participant B. In the most extreme case in this experiment, it would involve participant A sacrificing $4 to increase participant B's expected benefit by $4. Few decision makers can be expected to give up that much. On the other end participant A even gains money, $1, to make the decision granting participant B an increase of $4 in expected benefit. For a gain, any rational participant A should make the choice that helps both themselves and participant B. Even in the case involving no sacrifice or gain where the payments to participant A are the same, it is plausible to think that A will help out the B participant at no cost to themselves. Presented in a random order the various scenarios test participant A's choice given these personal options: gain of $1, neither gain nor sacrifice, and sacrifices of $1, $2, $3, and $4 to generate a $4 increase in participant B's expected benefit.

The question is if the participant A players will be willing to generate an increase of $4 to the expected benefit for participant B even at some, perhaps small cost, to themselves. The prior literature provides consistent evidence that when facing other-regarding decisions involving uncertainty some people will give up some of their own welfare on behalf of others, and this leads to our first hypothesis.

Hypothesis 1: Some decision makers under uncertainty will be willing to make other-regarding choices; the frequency of other-regarding choice is greater than zero.

This measures if participant A in the uncertain treatments makes the choice that benefits participant B even where it is costly to A. These costly other-regarding decisions will not determine the motivation behind the decisions.

Assuming that this hypothesis holds, it then leads to a second question, what will motivate dictators to switch to being self-interested? The decision maker can use an element as justification that they “believed” that the other participant would not be directly harmed by their own action, preserving the propriety of the dictator.[23]

[23] The literature contains many papers where participants take advantage of costless strategic ignorance to make a self-interested choice (Dana et al., 2007 [16]; Feiler, 2014 [18]; Grossman, 2014 [26]; Larson and Capra, 2009 [41]; Matthey and Regner, 2011 [43]; Nyborg, 2011 [49]); some participants are even willing to pay for their own self-interested strategic ignorance rather than know the other-regarding consequences (Cain and Dana, 2012 [7]; Grossman and van der Weele, 2015 [27]). Participants readily share or delegate the decision making with others so as to distance themselves from culpability for the self-interested choices they desire to be made (Dana et al., 2007 [14]; Hamman, 2010 [30]; Bartling and Fischbacher, 2011 [4]; Coffman, 2011 [9]). Participants are so averse to making self-interested decisions that some are willing to pay to exit the game rather than make the dictator game choice (Dana et al., 2006 [15]; Jacobsen et al, 2011 [32]). Note in the last case that a Pareto improvement over this exit choice would be to not exit so as to keep everything in the dictator game or choose to give the exit cost to the recipient.

One possible source of such self-justification not fully explored or isolated in the prior literature is ambiguity. In a choice involving ambiguity, a decision maker doesn't know with certainty which option would help the other person. They are free to form a belief focused on the situations where both participants' interest are aligned justifying their self-interested choice ignoring or discounting the situations where the other-regarding choices would not further their own self-interests, consistent with the prior literature on other wiggle room mechanisms. This leads to our second hypothesis**:**

> **Hypothesis 2**: Participant A's frequency of other-regarding choices in the ambiguity treatment will be smaller than in the uncertainty treatment.

We are beginning to distinguish the source of the tradeoff between other-regarding and self-interested choices, differentiating behavior in uncertain situations from behavior in ambiguous situations.

The experiment is further designed to distinguish between choices made based on views and beliefs about ambiguity as opposed to choices based on the interplay of self- and other-regarding interests. We wish to determine the decision maker's motivation behind any switches between other-regarding and self-interested decisions. In the classical Ellsberg paradox, there were no other-regarding payments, no decisions or tradeoff between self and other-regarding interests. In the Ellsberg paradox, participants have consistent bias beliefs about ambiguity where they are willing to give up some of their own potential income in order to avoid the ambiguous alternative. Here we are trying to observe the use of ambiguity as a device to facilitate self-interested behavior and distinguish this type of behavior from consistent bias about ambiguity. Will decision makers pass pliable inconsistent relative judgements without foundation about the outcomes under ambiguity, switching their beliefs about ambiguity in different situations so that beliefs align with their decision preference in the direction of the self-interested choices? Alternatively, their decisions could be consistently aligned towards or away from the ambiguous choices. Our observations will test for and distinguish motivations based on Ellsberg paradox style consistent ambiguity bias versus motivations based on following their self-interested interests.

Hypothesis 3: Participant A decision maker's frequency of being other-regarding will be consistent independent of the direction of the ambiguity treatment.

Further along this line of investigation we want to control for any directional bias there may be in other aspects of our experiment design and account for or remove any artifact this may generate in our analysis of the ambiguity results. We have tried to make these directional biases as innocuous as possible so as to minimize any possible directional bias, but they may still have some influence. As in other experiments, our game design has a few directional features: 1) the rightward choice is known to all to always have 1/3 of the balls (a known probability of payment to the other participant), the number of balls in the centerward choice may be known to the decision maker but is always unknown to the other participant; 2) both participants know the payoff to the decision maker for the center choice is $15, but only the decision maker knows their own payoff for the rightward choice. There may be some directional bias in participant A's decisions based on participant B's knowledge of participant A's payoff probabilities or participant A's compensation. Further some graphical elements may also present potential bias, although we are trying to control for this by randomizing the color presentation and randomizing the total number of balls in the urn.

Our hypothesis is that there is no directional bias, but what is important is to be aware of the magnitude of any potential directional bias in the uncertain treatments when examining the results of the ambiguous treatments. There are several paired combinations that cross-test for directional bias. The first will be to test if there is any directional bias in our base uncertain treatment. Next will be to separate *Hypothesis 2* of the move towards self-interest in the ambiguity treatment compared to the uncertainty treatments into two separate tests: i) the first where the other-regarding choice is rightward and ii) the second where the other-regarding choice is centerward. Here we are trying to distinguish if any situational directional bias is responsible for the uncertain versus ambiguity results or if the behavioral decisions are responding to the switch between the uncertain and ambiguous treatments.

> **Hypothesis 4**: Participant A's frequency of other-regarding decisions will be consistent independent of the direction in the uncertain treatment.

> **Hypothesis 5**: As in *Hypothesis 2* participant A's frequency of other-regarding decisions in the ambiguity treatment will be smaller than in the uncertainty treatment in both the situations where i) the other-regarding choice is rightward and is not ambiguous and ii) the situation where the other-regarding choice is centerward and becomes ambiguous.

Unlike other experiments, we do not start with a baseline reference deterministic treatment with high other-regarding interest. We do have a different type of high other-regarding baseline treatment that removes self-interest from the choices and examines subjects' choice made solely over other-regarding decisions.

However, the experimental design allows us to use a high other-regarding baseline in which decisions are made where the decision maker's own welfare is not affected by the choice (the self-indifferent scenario, as their compensation is the same for either decision) compared to the decision maker's actions in treatments where self-interested and other-regarding decisions are in opposite directions. We will examine this under both the uncertainty and the ambiguity treatments. This self-indifference treatment is a measure of the decision maker's level of care in acting on behalf of the other participant to maximize the other participant's compensation. The treatments continue to include uncertainty and ambiguity in the payment to the other participant; however there is no self-interested reason to use these devices to avoid maximizing the other participant's expected compensation. Although we expect most participants to exert some effort to pick the choice most favorable to the other participant, it is possible that some participant for various reasons may not be exerting this level of care for others or may have some other systematic bias.

> **Hypothesis 6**: Participant A's frequency of other-regarding decisions in the opposing-interests treatment is less than in the self-indifferent treatment, this should hold across all other treatment scenarios.

Hypothesis 6 will be tested on each different treatment: with uncertainty and with ambiguity, with rightward and centerward other-regarding choices, and on all subtotals as well.

In addition to the baseline directional bias tested in *Hypothesis 3 and 4* we should test for and expect no or minimal directional bias in the self-indifferent treatments. It is important to understand any baseline bias, so as to control for it in our interpretation of the results.

> **Hypothesis 7**: Participant A's frequency of other-regarding decisions in the self-indifferent treatments will be consistent independent of the direction of the other-regarding choice.

Unlike in *Hypothesis 2 and 5* where we expect the decision maker to take advantage of the additional complexities of ambiguity to make fewer other-regarding choices; in the self-indifference treatment there is no reason to differentiate the level of other-regarding behavior between the uncertain and ambiguous treatments. We would want to be cognizant of any bias when interpreting the results.

> **Hypothesis 8**: Participant A's frequency of other-regarding decisions in the self-indifferent treatments will be consistent and independent of the uncertain and ambiguous treatments.

For robustness we also check by fitting a logit model of the observed behavior to the data and interacted terms (pairs of payment and treatment variables were interacted so that this combined term only had the payment amount or treatment conditional on the other treatment also being present). The test was to see if the presence of ambiguity interacted with opposing interest (based on *Hypothesis 2* this is where we expect to differentiate decisions in the ambiguous treatment from the uncertain treatment) had any effect on the choice variable with controls for other variables in the model.

$$Other\ regarding\ choice = \alpha \cdot ambiguity \cdot opposing + \beta \cdot X + \varepsilon$$

Where α is the coefficient of interest for the interaction that this is an ambiguous opposing treatment, β is the coefficient for all the other X control covariate variables and ε is the residual error.

> **Hypothesis 9**: In opposing-interest situations, participant A makes less frequent other-regarding choices in the ambiguity treatments: $\alpha < 0$

There are several ways to quantify and test these hypotheses. The fundamental design of the experiment is based on the idea of a multiple-price list similar to that used in Holt and Laury, 2002 [31]. In that experiment they were looking at the switchover point between safe and risky option to measure the degree of risk aversion for a decision maker. Here we can look at the switchover point between other-regarding and self-interested choices to measure their other-regarding behavior. In our experiment to control for any anchoring bias and question-order bias we present the individual question of the multiple-price list individually and in a different random order for each subject. One way of testing hypotheses would be to compare the switchover point – the point on our price list of self-interested pay where the dictator switches between making the self-interested choice and making the other-regarding choice; and then comparing this switchover point between the ambiguous and uncertain test treatments. A similar metric would simply be to compare the number of other-regarding choices in the two treatments. Our random order presentation of questions does not control for a single switching point for each subject in the way that a single multiple-price list could (such as that used by Holt and Laury). Thus, it was easier to compare the total number of other-regarding choices in the two experiments, rather than construct some artificial data method to deal with multiple switching points in an individual subjects' data. We also examined an alternative specification of the regression using both the first or last switching point, and the results were similar to those presented.

Examining the 8 scenarios where participant A's interest is opposite the interest of participant B, we counted the number of other-regarding decisions participant A makes. See *Figure 3* for Scenarios 1-4 where the other-regarding choices are rightward and for Scenarios 14-17 where the other-regarding choices are centerward. In this treatment known probabilities determined participant B's payment. The details of this analysis are in the results section.

In the second treatment, we shift to ambiguous probabilities; we will test if ambiguities weaken participant A's culpability possibly through allowing the decision maker to form beliefs or focus thoughts within the ambiguities, wiggle room that their self-interested choices are also benefiting the other participant.

15 ball model example that can also be scaled to 30 or 45 ball model
Table of payments to decision maker (Participant A) if they chose the Center or Right Ball color

i) More Left Balls

	Left	**Self Regarding Center**	**Other Regarding Right**
Example Ball Configuration:			
Number of Balls:	7	3	5
Expected Pay to B:	N/A	$11	**$15**
Scenario #			
1		***$15***	$11
2		***$15***	$12
3		***$15***	$13
4		***$15***	$14

iii) More Center Balls

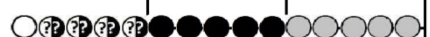
	Left	**Other Regarding Center**	**Self Regarding Right**
Example Ball Configuration:			
Number of Balls:	3	7	5
Expected Pay to B:	N/A	**$19**	$15
Scenario #			
14		$15	***$16***
15		$15	***$17***
16		$15	***$18***
17		$15	***$19***

Key: ***Self Regarding - A*** **Other Regarding - B**

Figure 3 Opposing Interest 8 Ball-Color-Pay Scenarios
The second row gives the expected payments to participant B when participant A choses the center or the right ball color. The columns show the payment options to participant A in each of 8 scenarios.

The statistical analysis in the next section will compare the number of other-regarding choices in the two treatments, uncertainty, and ambiguity, over the 8 scenarios where the expert and client have opposing financial interests. See *Figure 4* for the payments, probabilities (determined by the number of balls of each color) and expected payments associated with these comparison scenarios.

15 ball model example that can also be scaled to 30 or 45 ball model
Table of payments to decision maker (Participant A) if they chose the Center or Right Ball color

	i) More Left Balls				iii) More Center Balls		
	Left	**Self Regarding Center**	**Other Regarding Right**		**Left**	**Other Regarding Center**	**Self Regarding Right**
Control Certain Information							
Example Ball Configuration:							
Number of Balls:	7	3	5		3	7	5
Expected Pay to B:	N/A	$11	**$15**		N/A	**$19**	$15
Scenario #				Scenario #			
1		***$15***	$11	14		$15	***$16***
2		***$15***	$12	15		$15	***$17***
3		***$15***	$13	16		$15	***$18***
4		***$15***	$14	17		$15	***$19***
Ambiguous Treatments							
Example Ball Configuration:							
Number of Balls:	5-9	1-5	5		1-5	5-9	5
Expected Pay to B:	N/A	$11	**$15**		N/A	**$19**	$15
Scenario #				Scenario #			
18		***$15***	$11	31		$15	***$16***
19		***$15***	$12	32		$15	***$17***
20		***$15***	$13	33		$15	***$18***
21		***$15***	$14	34		$15	***$19***

Key: ***Self Regarding - A*** **Other Regarding - B**

Figure 4 Opposing-Interest 16 Ball-Color-Pay Scenarios
The second row gives the expected payments to participant B when participant A choses the center or the right ball color. The columns show the payment options to participant A in each of 16 scenarios.

When examining the self-indifferent treatment in *Hypotheses 6-8* our comparison statistic will be the frequency of other-regarding choices in Scenarios 5, 13, 22, and 30.

The Wilcoxon signed rank test and the student's t-test test are used to test both the median and mean or the results respectively.

2.6 Results

As described in the theory section we are measuring the behavior of decisions in situations with uncertainty and ambiguity by counting the frequency of other-regarding choices made. The choice is either an other-regarding decision (coded 1) or a self-interested decision (coded 0, in the self-indifferent treatment this is the not other-regarding choice); see *Figure 4* for a description of the uncertainty and ambiguity scenarios.

Figure 5 shows the distribution of the number of other-regarding choices made by our 33 subjects. Each subject had 8 opposing-interest decisions in the uncertainty treatment and then 8 more in the ambiguity treatment.

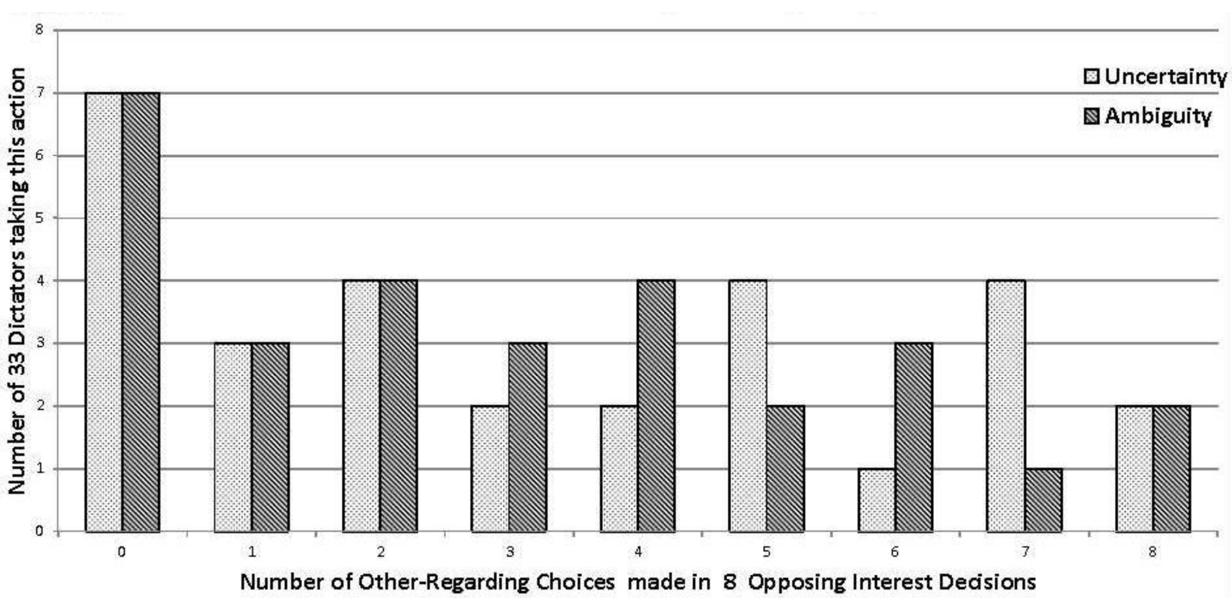


Figure 5 Dictators ranked by total number of other-regarding choices they made.

In *Figure 6*, we have also separated out the 4 decisions made when the rightward choice is other-regarding (scenarios 1-4 uncertainty and scenarios 18-21 where ambiguity is the opposite choice – the center choice) and the 4 decisions made when the center choice is other-regarding (scenarios 14-17 uncertainty and scenarios 31-34 where this is also the ambiguous choice). As can be seen by inspection, sometimes decision makers make other-regarding choices in the uncertain treatment, on average in 3.12 of the 8 decisions or 39% of the time the dictator selects the other-regarding choice giving up some of their own welfare to do so. The standard deviation is 2.84 and this is significantly different from zero at the 0.0001% level. Decision makers make some other-regarding choices under uncertainty – *Hypothesis 1* is not rejected.

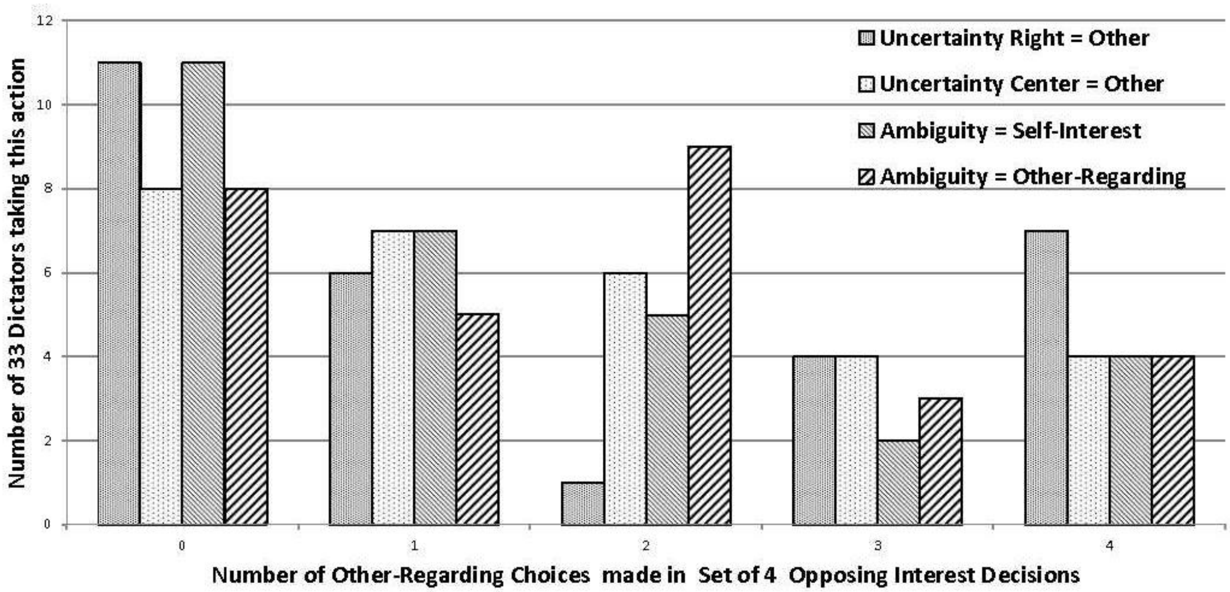


Figure 6 Dictators ranked by the number of other-regarding choices made by scenario type.

As would be expected, the frequency of other-regarding choices made by participant dictators was affected by the cost of this action to their own welfare, see *Figure 7*. As the cost of making an other-regarding choice decreases and eventually became a self-benefit, more dictators made the other- regarding choice. It should also be noted that the graphs for the uncertainty treatment and the ambiguity treatment are similar. When tested in the subsequent statistical evaluation, the results not statistically distinguishable.

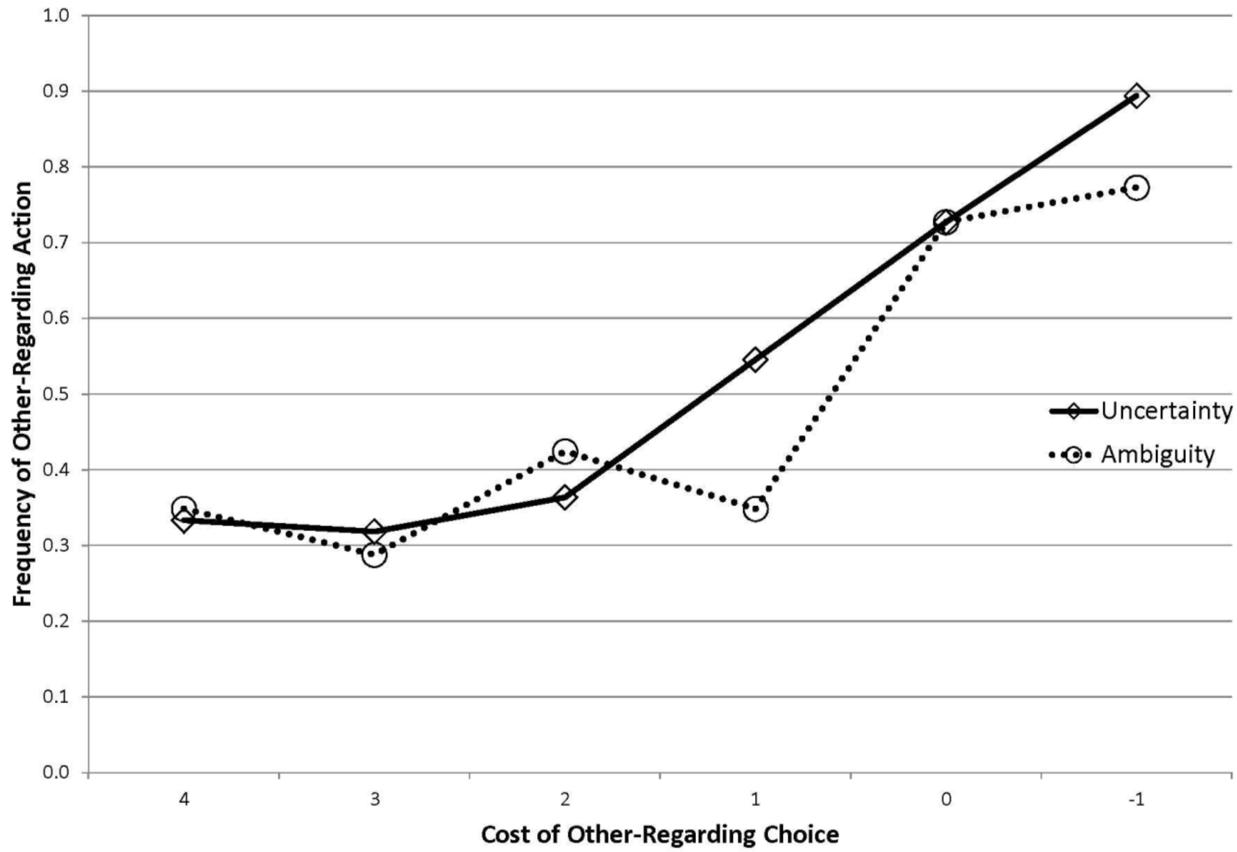


Figure 7 Frequency of other-regarding action for each cost to the dictator under ambiguity and uncertainty treatments.

The four columns in *Table 17* have several comparisons of decisions with uncertainty versus decisions with the ambiguity treatments. The first two columns are just different aggregations of the total data split parallel to the difference in *Figure 5* and *Figure 6*. A student's t-test and a Wilcoxon signed-rank test examine *Hypothesis 2*. In all 4 tests we observe no significant differences, rejecting H*ypothesis 2* (even if a one-sided test were used to test the hypothesis of a decrease in other-regarding choices, this would also be rejected) – decisions under ambiguity and uncertainty are not statistically distinguishable.

Test on 16 Scenarios with Opposing Interests
Test Other-Regarding Choices over Scenarios 1-4 & 14-17 vs. 18-21 & 31-34.

Frequency that Other-Regarding Choices are made by 33 Test Subjects
Assigned to Type A Decision Maker

	Frequency Other-Regard of 8 choice sets in the Scenarios	**Frequency Other-Regard choices in sets of 4 Scenarios**	**Frequency of Right is Other-Regard Scenarios 1-4 vs. 18-21**	**Frequency of Center is Other-Regard Scenarios 14-17 vs. 31-34**
Frequency of Other-Regarding Choice				
Uncertainty Control (known probabilities)	0.3902	0.3902	0.3864	0.3939
Ambiguity Treatment (unknown prob.)	0.3523	0.3523	0.3106	0.3939
Difference	0.0379	0.0379	0.0758	(0.0000)
Std Dev Dif	0.1725	0.2451	0.2379	0.2500
Students t-Test Within-Treatment t value	1.2611	1.2554	1.8296	(0.0000)
Prob (|T| > |t|)	0.2164	0.2138	0.0766	1.0000
Wilcoxon signed-rank test				
z	(1.0250)	(1.0630)	(1.3600)	(0.1340)
Prob > |z| of No Difference	0.3055	0.2878	0.1738	0.8932
Sample Size:	n=33	n=66	n=33	n=33

Table 17 Wiggle Under Test Treatment Ambiguity vs. Uncertainty Control. Comparison of other-regarding choices between uncertainty and ambiguity (top three rows) and statistical analysis (below).

In *Table 17*, the 3rd column examines H*ypothesis 5-i* with rightward other-regarding choices that are not ambiguous, and the 4th column examines H*ypothesis 5-ii* about centerward Other-Regarding choices that switch to being ambiguously defined.[24] As with *Hypothesis 1,* the Wilcoxon signed-rank test (that compares medians) of *Hypothesis 5* rejects the hypothesis above the 10% level. However, in the Hypothesis 5-i t-test in column 3 there is a tendency for rightward Other-Regarding switch to ambiguity in the mean, but the t-Test is not statistically

[24] It should be noted that for the test of *Hypothesis 1* the rightward and centerward data in columns 3 and 4 are aggregated but treated as separate frequency samples in the 2nd column and are combined by participant into a single frequency per participant in the 1st column. The resulting average frequency is the same and though the number of data points in the sample is now larger, even with the increased sample size the tests have very similar results.

significant (p = 0.077) whereas *Hypothesis 5-ii* in the opposite direction tested in column 4 is rejected.

Switching to *Table 18* and continuing the examination of *Hypothesis 5*, the first opposing interests section of *Table 18* transposes the same data as in *Table 17.* In the ambiguity treatment in the last column the decision chosen is moving towards the center choice [the factor is higher on the second (center choice) row than on the first (right choice) row] with 1-5 possible balls in the urn determining the probability of the others-favorable payment away from the rightward choice that has 5 balls, a one-third chance for a favorable other payment. They are moving towards an option that would be unfavorable for the other in most cases, 1-4 balls, and might be equivalent for the other only in the maximum possible case of 5 balls. The decision makers are overestimating the value of the 1-5 balls relative to uncertainty when the similar treatment had 3 balls for the centerward option, and they were choosing the rightward 5 balls option instead at slightly higher frequencies. However, this tendency is not significant (p = 0.086)

Some dictator participants took mild advantage of the ambiguity by making an insignificant increase in centerward self-interested choices when the outcome of that choice that they are switched to is ambiguous for the other participants payment. They were not taking advantage of ambiguity to switch away from the centerward other-regarding choice in the *Hypothesis 5-ii* scenarios when the choice they were making under uncertainty becomes ambiguous about the payment to the other. Although this is not the full flexibility of the use of ambiguity that we expected, this is nevertheless a shifting use of ambiguity indicating that there is not a single opinion or bias about ambiguity, but rather there is an overriding self-interested preference in all scenarios.

Test on 16 Scenarios with Opposing Interests versus 4 Self-Indifferent Scenarios
Test Other-Regarding versus Ambiguity Motivations

Frequency that Other-Regarding Choices are made by 33 Test Subjects

			Total Other-Regard of all choice sets in the Scenarios	Uncertainty - known probabilities # 1-4, 14-17, 5 & 13	Ambiguity - unknown probabilities #18-21, 31-34, 22 & 30
Frequency: Other-Regarding choice versus opposing Self-Regarding choice					
Other-Regarding is Right is not Ambiguous = 1	Self is Center is Uncertain or Ambiguous	# 1 - 4 & 18-21	0.3485	0.3864	0.3106
Other-Regard is Center is Uncertain or Ambiguous = 1	Self-Interested is Right is not Ambiguous	# 14-17 & 31-34	0.3939	0.3939	0.3939
Other-Regarding (all) = 1	Self-Interested (All) = 0		0.3712	0.3902	0.3523
	Students t-Test Within-Treatment 2-sided		28.00%	89.12%	***8.58%***
Frequency: of Other-Regarding choice in self-indifference treatment					
Other-Regarding is Right is not Ambiguous = 1	Self-Indifferent (payoff is the same)	# 5 & # 22	0.7121	0.7879	0.6364
Other-Regard is Center is Uncertain or Ambiguous = 1	Self-Indifferent (payoff is the same)	# 13 & # 30	0.7424	0.6667	0.8182
Other-Regarding (all) = 1	Self-Indifferent (payoff is the same)	# 5, 22, 13 & 30	0.7273	0.7273	0.7273
	Students t-Test Within-Treatment 2-sided		62.45%	16.05%	***8.31%***
Students t-Test Opposing Other-Self choice vs Other-Indifferent choice 2-Sided t-test					
Other-Regarding is Right is not Ambiguous = 1		#1 - 4 & 18-21 v. 5 & 22	0.01%	0.01%	0.27%
Other-Regard is Center is Uncertain or Ambiguous = 1		#14-17 & 31-34 vs. 13 & 30	0.01%	1.28%	0.02%
Other-Regarding (all) = 1				0.04%	0.00%

Table 18 Test preference about ambiguity versus other-regarding choices.

Though we take issue with Haisley and Weber, 2010 [29], a double-lottery treatment not really falling under the strict definition of ambiguity, the two experiments can be compared – the two experiments are different, but both add more complex elements to the underlying uncertainty-probabilities treatment. The alignment of elements in the Haisley and Weber experiment isclosest to our test in *Hypothesis 5-i.* Their experiment only tests situations similar to *Scenarios # 18-21* where their more complex double lottery (labeled ambiguity) is the self-interested choice, and they find a significant increase in self-interested choices in this treatment where we observe an insignificant increase in self-interested choices switching towards less valuable, ambiguous other payments. The findings in Haisley and Weber are at least in line with our findings in loosely related tests. They do not test the symmetrical case where ambiguity aligns with the other-regarding choices such as our *Hypothesis 5-ii* where we observe no difference in behavior.

Testing *Hypothesis 3* concerning the consistency of choices to the direction of ambiguity in the third column of *Table 18,* just as for *Hypothesis 5-i* we observe an insignificant difference (p = 8.6%), not quite rejecting the consistency hypothesis. As noted in the discussion of *Hypothesis 5-i,* the behavior in *Scenarios # 18-21* would appear to be different than either the similar treatments with only the direction of ambiguity switched (falling just short of rejecting *Hypothesis 3*) and different from the similar treatment that only switches to uncertainty (falling just short of rejecting *Hypothesis 5-i*). It would appear that this is the outlying choice where behavior may exhibit changes, though just short of being significant.

Testing *Hypothesis 4* concerning the consistency of choices independent of the direction in the uncertainty treatments in the second column of *Table 18*, the consistency of choice is not rejected. When other-regarding-is-right is tested against other-regarding-is-center to see if they are different, the difference is rejected (t-test is 0.89).

The next section of *Table 18* shows the decision made by dictator participant A when their own welfare is indifferent as they received the same compensation for either decision. This self-indifferent behavior is compared against the opposing-interest results (the first section of this table), the results are in the last section of *Table 18* showing the Students t-tests for the various treatment groups; all behaviors are found to be significantly different at or in most cases significantly below the 1.3% level, and thus *Hypothesis 6* is not rejected. Self-indifferent decision makers are making other-regarding choices at a much higher frequency than in the opposing-interest treatments, this being true for all combinations of uncertainty or ambiguity as well as for either the center or rightward choice being other-regarding.

Testing *Hypothesis 7* concerning the consistency of choices independent of the direction of Other-Regarding choice in the self-indifferent treatment the t-test are in the last line of the middle self-indifference section of *Table 18* (the t-tests are 62%, 16%, and 8.3%). Again, ambiguity showed a slight but insignificant difference between the choice when the Other-Regarding choice that aligns or does not align with the ambiguity treatment, for the uncertain case and grand total cases we do not find any difference and thus do not reject the consistent choices Hypothesis 7.

For *Hypothesis 8* concerning the consistency of self-indifferent choices independent of the uncertain or ambiguous treatments, we compare the uncertainty results in the second column with the ambiguity results in the third column for the middle self-indifference section of *Table 18.* The t-tests p values not show in the table are 0.096, 0.17, and 1.00, for the rightward, centerward and all rows respectively. This is similar to *Hypothesis 5-i* when the Other-Regarding choice has a non-significant tendency only in the rightward direction. Here for *Hypothesis 8* when the dictators are self-indifferent about the choices there is a slight insignificant tendency for some directional differences particularly the rightward case. This might indicate that even in the absence of self-interest, motivation decision makers are overestimating the value of this less favorable ambiguous alternative to the welfare of the other. However, this may be reading too much into the complex insignificant results. For the Other-Regarding-is-centerward case and the grand total cases we do not reject the consistent choices Hypothesis 8.

Despite the failure of *Hypothesis 2* for behavior under ambiguity to exhibit differentiation from the behavior under uncertainty we still need to check for such behavior with a logit model in *Hypothesis 9* as the additional control variables in the model might be able to isolate any change in behavior driven by the switch from uncertainty to ambiguity. As might be suspected, there was no significance to α, the ambiguity-opposing interest coefficient, again indicating that there was no significant difference between the behavior under the ambiguity and uncertain treatments. See *Table 22* in the Appendix, we ran twelve different variations on the model and in no case was α significantly different from zero at the 95% confidence level.

Further robustness checks are also included in the Appendix *Table 17* and *Table 18*. Not surprisingly we did find that participants were making a self-interested choice, not a rightward or centerward choice; see *Table 18* and *Table 21* in the Appendix that being the only cases where we found significance.

2.7 Conclusion

The expert behavior, dictators' choice, is equally self-interested when the question at hand contains uncertainty or contains ambiguity. Neither the expert nor the client would be better off if the expert or a third party invested in research or education to alleviate the ambiguity by clarifying the probabilities of the uncertain outcomes; the expert behavior does not become more other-regarding nor does it become more self-interested.

This result is essentially different than the findings of Haisley and Weber, 2010 [29] although the insignificant differences in behavior that we did find were consistent with Haisley and Weber's observations. Their double lottery has some complexity similarities to our Ellsberg ambiguity treatment. When treated with this double lottery or our ambiguity, both experiments observe an increase in the self-interested choice. Haisley and Weber observed a significant increase where we observed an insignificant increase. Although the levels of significance and designs of the experiment are quite different, it is reassuring that we see something slightly similar in the homologous treatments.

By using ambiguity with unknown probabilities, we distinguish our experiment from Haisley and Weber, 2010 [29] where they instead used nested double lottery that is really just a more complex lottery. Further by designing the experiment symmetrically to distinguish ambiguity from self-interest wiggle room, we are able to isolate these behaviors; whereas in Haisley and Weber, 2010 [29] the double lottery is always aligned with the self-interested action and is thus indistinguishable. Overall, our results reject a difference in choices under ambiguity when compared to uncertainty, though in a very narrow situation we find a small marginal increase in self-interested choices using ambiguity as a wiggle room cover to justify this action.

There is a robust difference to other-regarding choices in the presence of indifference compared to the presence of an opposing Self-Interested choice, in all cases the difference is significant to the 1% level, and in the full data set and other scenarios, it is significant to the 0.01% level. The point here is that the observed behavior is overwhelmingly being driven by self-interest choices in all ambiguous and uncertain treatments where a self-interested choice is available.

Our experiment has found that ambiguity is not the cause of a shift towards self-interested choices when there is a mechanism present that allows for wiggle room. We suggest that this self-interested wiggle room shift is primarily made possible by uncertainty, and that the addition of ambiguity plays little role. To strengthen the findings and extend the conclusions to addressing the role of uncertainty, this experiment would benefit from including choices where there are single deterministic outcomes that do not facilitate wiggle room behavior. We did not run the traditional control of certain payments confirmed throughout the literature to exhibit strong other-regarding behavior. We did run a control where the dictators' payments were constant whatever choice was made, so there was no reason not to make the other-regarding choice. However, as can be seen the self-indifference treatments reported in *Table 18* the dictators are not all making the other-regarding choice although a large majority do make the other-regarding choice. In the aligned interest case, some dictators even fail to make the choice that would benefit both participants.

Other experiments have consistently shown that participants make more self-interested choices in uncertain situations with known probabilities when compared to choices with deterministic single outcomes (Dana et al. 2007 [16], Haisley and Weber 2010 [29], Krawczyk & Le Lec 2008 [38], Karni et al. 2008 [33]). Although we have not run deterministic treatment frames in this experiment, we presume that our subjects are using both the uncertain and ambiguous situations to make more self-interested choices than they would in a deterministic framing where they would situationally feel more obligation to make other-regarding choices so as to preserve the appearance of propriety.

These experiments might show more significance were additional experiments performed or were the experiments repeated in list format where a single crossing point was chosen. The experiment would probably also benefit from a "control" treatment with certain outcomes for the choices. Finally, there might be some ideas to treat either or both the ambiguity and uncertainty treatments in ways to promote more other-regarding behavior. In Cox et. al., 2016 [13], for gastrointestinal ward-discharge decisions, the decision process had a computer probability and expected payment benefit based recommended action.

Doctors using this system when overriding the recommendation are required to affirm their choice with a written explanation justifying their decision. Even without auditing the written explanations, Cox et. al. found in test experiments with real medical charts (but without the patient) that this method optimized the decision of when to override the computer's recommendation.

Unfortunately, as no difference was found between the ambiguous and uncertain treatments, treating ambiguous situations with information discovery to make them uncertain would not be anticipated to improve the recipient participant B's outcome.

APPENDIX

A.1 Recommendations – Methods Appendix

By using these carefully designed pairs of tasks we are able to thwart any concerns that experts might be making rational other-regarding recommendations based on their assumptions about the utility preferences of their clients. We exclude the possibility that experts could just be acting on their assumption about their client's utility; we eliminate the possibility that the self-interested recommendation is really the "fault" is the experts' "extreme" assumptions about their client's utility and not the expert's own self-interest and lack of other-regarding concerns. Thus, when an expert is self-interested in both tasks in our opposing paired task, the actions can be identified as genuinely self-interested. There is no longer an unlikely utility preference assumption to hide self-interest behind. By eliminating this concern, we will be able to focus on the effect of communication on the quality of recommendations.

We examine the incompatibility of the two paired self-interested recommendations under constant relative risk aversion's (CRRA) isoelastic power utility function assumptions in the same way risk aversion is measured in Holt and Laury, 2002 [31], Risk aversion and incentive effects, and elsewhere. We further show that self-interested recommendations in the opposite paired task are also incompatible under constant absolute risk aversion's (CARA) exponential utility function, see the appendix. We also examine less parametric preferences, such as some simple rules of thumb, similarly concluding that other-regarding concern for the client's alternative utility preferences would still be incompatible with making both paired self-interested recommendations. Thus, we systematically eliminate several alternative interpretations or rationalizations for what recommendations are motivated by self-interest so that we can more accurately identify and measure the effect of communication on any potential self-interested actions.

The tradeoff between other and own compensation (a choice of $5 more to other versus $1 more to self) are selected to be a little bit larger than the standard tradeoff in many other experiments where frequently the effective choice is between an additional $3 payment to the other versus $1 payment to self. In this experiment we are testing more complex multiple levels of additional task and treatments where we are hoping to observe a slow progression from the other-regarding behavior at the baseline to more self-interested recommendations as each additional complexity of the tasks and treatments adds additional wiggle room. In the prior experiments often subjects reached their saturated self-interested level with any wiggle room treatment, and thus if we were to use these “standard” tradeoffs we would not be able to distinguish between the levels of behavior with multiple and different task and treatments.

We want to be able to layer levels of additional wiggle room and observe additional motion with each layer of wiggle room. In the other experiments in the literature with $3:$1 the decision makers in a transparent decision start out with the majority (about 70%) being other-regarding and then the majority saturate their self-interested behavior at the first occurrence of wiggle room (at about 70% self-interested). A small group of decision makers remaining other-regarding continuing to give up $1 so that the other can receive $3 under any treatment. This results in a switch in about 40% of the subjects. In general, the experiments don’t observe subject being more than 70% self-interested or more than 70% other-regarding. Presuming that we will observe similar saturation on the end points, we want to with each task or treatment to add a layer of additional wiggle room, thus being able to observe additional self-interested action. In this design we want less than all 40% of the subjects who are responding to wiggle room to switch with the first (uncertain) task that provides the first layer of wiggle room. We want to be able to observe additional or different levels of self-interest when we add the communication treatment or when we move through the six different tasks.

If we run a "test" experiment (to observe if the \$5:\$1 other-regarding tradeoff is appropriate), we should also run a second round/treatment where the expert and clients will both be fully information and will select what option they would like to select for themselves. Participant would not be informed about the second round/treatment until after the first round/treatment. This should be sufficient to confirm "comprehension" and hopefully nearly 100% client choice of the E(A) = \$10 option. As we agreed we don't need the self-selection data, though showing understanding of the setup will help exclude simple confusion as another self-interested excuse. In this preliminary "test" we would pay one random task from each of the two treatments/rounds.

A.2 Wiggle Room - Robustness check investigate other sources of observed behavior.

Frequency that Other-Regarding Choices are made by 33 Test Subjects
Assigned to Type A Decision Maker

	Frequency of Rightward Choices in 8 choice set Scenarios	**Frequency of Rightward Choices in each 4 choice set Scenarios**	**Frequency of Rightward is Self-Interest Scenarios 1-4 vs. 18-21**	**Frequency of Rightward is Other-Regard Scenarios 14-17 vs. 31-34**
Frequency of Rightward Choice				
Ambiguity Treatment (unknown prob.)	0.5417	0.5417	0.6894	0.3939
Base Case (known probabilities)	0.5038	0.5038	0.6136	0.3939
Difference	(0.0379)	(0.0379)	(0.0758)	(0.0000)
Std Dev Dif	0.1725	0.2451	0.2379	0.2500
Students t-Test Within-Treatment t value	(1.2611)	(1.2555)	(1.8296)	(0.0000)
Prob (|T| > |t|)	0.2164	0.2138	0.0766	1.0000
Wilcoxon signed-rank test				
z	1.2320	0.8540	1.3600	(0.1340)
Prob > |z| of No Difference	0.2178	0.3932	0.1738	0.8932
Sample Size:	n=33	n=66	n=33	n=33

Table 19 Test Treatment Ambiguity Averse (rightward) vs. Uncertainty Control.

In *Table 19* we are checking if the dictator's decisions are based on a more rightward or more centerward choice when comparing the uncertain control against the ambiguity treatment. The test is similar to *Table 17* except that in *Table 17* self-interested was coded as 1, in *Table 19* rightward is coded as 1. Thus, the direction switches for Scenarios 1-4 and 18-21. As can be noted from columns 3 and 4, the behavior is not similar in that Scenarios 1-4 are making the same frequency of rightward choices as Scenarios 14-17, the same also being true for the ambiguous treatment. Just as in *Table 17* with the self-interested behavior, there is little difference between the rightward behavior in the uncertain and ambiguous treatments.

Test Other-Regarding Choices symmetry over Scenarios 1-4 & 18-21 vs. 14-17 & 31-34.

Frequency that Other-Regarding Choices are made by 33 Test Subjects
Assigned to Type A Decision Maker

	Frequency Other-Regard of 8 choice set Scenarios	**Frequency Other-Regard in each 4 choice set Scenarios**	**Frequency Other-Regard Uncertainty (known prob)**	**Frequency Other-Regard Ambiguity Treatment**
Frequency of Other-Regarding Choice				
Other-Regarding is Right # 1-4 & 18-21	0.3939	0.3939	0.3939	0.3939
Other-Regarding is Center # 14-17 & 31-34	0.3485	0.3485	0.3864	0.3106
Difference	(0.0455)	(0.0455)	(0.0076)	(0.0833)
Std Dev Dif	0.2376	0.2939	0.3155	0.2700
Students t-Test Within-Treatment t value	(1.0989)	(1.2566)	(0.1379)	(1.7728)
Prob (|T| > |t|)	0.2800	0.2134	0.8912	0.0858
Wilcoxon signed-rank test				
z	1.5040	1.4160	0.2890	1.7880
Prob > |z| of No Difference	0.1325	0.1568	0.7727	0.0738
Sample Size:	n=33	n=66	n=33	n=33

Table 20 Test Symmetry of Other-Regarding Center vs. Right.

In There is more positive information about the rightward choice than the centerward choice, the probability is constant and is known by the recipient whereas the probability of centerward choice is changing in some cases is ambiguous and is not known by the recipient. Thus, there might be a theory that the dictator might make choices favoring this more positive information. We test this issue two ways in *Table 20* the test is to see within each of the two treatments (ambiguity and uncertainty) if there is a difference between the Center and Rightward choices when they are the self-interested choice. In *Table 21* we test if there is a centerward or rightward bias within each of the two treatments (ambiguity and uncertainty). On average dictators are choosing self-interestedly, thus when measuring a self-interested choice (rightward) against an other-regarding choice (rightward), it is clear they are making a self-interested choice not a rightward choice whereas in *Table 19* the centerward versus rightward choices are mostly not distinguishable.

Test on 16 Scenarios with Opposing Interests
Test if Rightward choice independent of Interests over Scenarios 1-4 & 18-21 vs. 14-17 & 31-34.

Frequency that Rightward Choices are made by 33 Test Subjects
Assigned to Type A Decision Maker

	Total Rightward Choices of 8 choice sets in the Scenarios	Average Rightward Choices in each 4 choice sets in the Scenarios	Base Case (full informaiton) Rightward choice Scenarios 1-4 vs. 14-17	Ambiguity Treatment Right choice Scenarios 18-21 vs. 31-34
Frequency of Rightward Choice				
Other-Regarding is Rightward # 1-4 & 18-21	0.6061	0.6061	0.6061	0.6061
Self Interest is Rightward # 14-17 & 31-34	0.3485	0.3485	0.3864	0.3106
Difference	(0.2576)	(0.2576)	(0.2197)	(0.2955)
Std Dev Dif	0.6599	0.6779	0.7092	0.6539
Students t-Test Within-Treatment t value	(2.2422)	(3.0868)	(1.7796)	(2.5957)
Prob (|T| > |t|)	0.0320	0.0030	0.0846	0.0141
Wilcoxon signed-rank test				
z	(2.2080)	(2.9690)	(1.8010)	(2.3990)
Prob > |z| of No Difference	0.0272	0.0030	0.0716	0.0165
Sample Size:	n=33	n=66	n=33	n=33

Table 21 Test Symmetry of Rightward Certainty of Other

Full Logit and Regression Models on all 34 Scenarios
Test Self Interested Wiggle Choices of Scenarios 1-4 & 18-21 vs. 14-17 & 31-34.

		Components of fully robust choice model.									Reduced model only over Opposing Cases		
Components of Models		**Logit Binary Model**	**Logit Scalar Model**	**OLS Binary Model**	**Logit Social Regarding Binary**	**Logit First Switch Binary**	**Logit Average Switch Binary**	**Logit Last Switch Binary**	**Logit Center vs. Right Binary**	**Logit Average Switch Center vs. Right**	**Logit Binary Model**	**Logit Scalar Model**	**OLS Binary Model**
Wiggle	Estimate	0.3558	(0.0267)	0.0839	0.3687	0.2519	0.0377	0.4963	split	split	0.1673	(0.2306)	0.0379
(Self x Treatment x Opposing)	Std Error	0.5166	0.2351	0.0913	0.3539	0.6570	0.7016	0.6415			0.1808	0.1635	0.0301
	p-Value	0.4910	0.9100	0.3590	0.2980	0.7010	0.9570	0.4390			0.3550	0.1580	0.2090
	95% Confidence	(0.6567)	(0.4874)	(0.0951)	(0.3249)	(1.0358)	(1.3375)	(0.7611)			(0.1871)	(0.5509)	(0.0212)
	"	1.3682	0.4341	0.2629	1.0623	1.5395	1.4129	1.7537			0.5217	0.0898	0.0969
Self Pay	Estimate	1.1085	0.5946	0.2466	1.2817	2.0365	2.1356	1.8095	1.1168	2.4255	0.4467	0.2908	0.1098
	p-Value	0.4910	0.9100	0.3590	0.2980	0.7010	0.9570	0.4390	0.0000	0.0000	0.0000	0.0120	0.0760
Treatment	Estimate	(0.1450)	(0.1398)	(0.0324)	(0.1472)	0.2967	(0.2801)	(0.8057)	(0.1152)	(0.1881)	(0.1673)	(0.1671)	(0.0379)
	p-Value	0.2820	0.3050	0.0940	0.2700	0.0710	0.0810	0.0000	0.0000	0.0000	0.3550	0.3580	0.2090
									Opposing: Right is Self				
Opposing interests cases	Estimate	0.4303	0.8588	0.1031	(0.0944)	0.3985	0.7275	0.9406	0.4578	1.2184	--	--	--
	p-Value	0.2550	0.0320	0.1130	0.7070	0.3970	0.1540	0.0450	0.2580	0.0270	Is equal to specifications so not included.		
									Opposing: Center is Self				
								Estimate	(0.3827)	0.1016			
								p-Value	0.3960	0.8670			
Self Pay x Treatment	Estimate	(0.3866)	(0.2051)	(0.0711)	(0.3647)	(0.2594)	0.1078	(0.0076)	(0.3975)	0.0944	N/A binary var. is Identical to Wiggle	N/A binary var. is Identical to Wiggle	N/A binary var. is Identical to Wiggle
	p-Value	0.1520	0.2240	0.0680	0.0890	0.4800	0.7830	0.9820	0.1490	0.8300			
Opposing x Treatment	Estimate	N/A binary var. is Identical to Wiggle	0.4664	n/a	n/a	n/a	n/a	n/a	n/a	n/a	--	--	--
	p-Value		0.3870	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Is equal to specifications so not included.		
Self Pay x Opposing	Estimate	N/A binary var. is Identical to Opposing	(0.3023)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	--	--	--
	p-Value		0.0810	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Is equal to specifications so not included.		
Other Pay	Estimate	1.0900	0.2822	0.2398	0.8178	1.5402	2.1496	2.1905	1.0883	2.2715	N/A binary var. is invers of Self Pay	0.0672	N/A binary var. is invers of Self Pay
	p-Value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.3820	
Other Pay x Treatment	Estimate	(0.1983)	(0.0676)	(0.0251)	(0.2380)	(0.2020)	(0.1814)	(0.3121)	(0.1952)	(0.1460)	--	(0.1832)	--
	p-Value	0.5390	0.3840	0.6320	0.3020	0.6070	0.6990	0.4720	0.5450	0.7640		0.0960	
Both have **Same** Interests	Estimate	(0.2565)	0.0312	(0.1050)	(0.1461)	(0.6844)	(1.1128)	(0.8159)	(0.2585)	(1.3701)	--	--	--
	p-Value	0.4530	0.6250	0.0650	0.6640	0.1180	0.0400	0.0740	0.4520	0.0140	Is excluded by specifications so not included.		
Constant (Rightward)	Estimate	(0.0318)	(0.0575)	0.4938	(0.0449)	0.6094	(0.1192)	(0.8152)	(0.0536)	(0.5904)	(0.0159)	(0.0163)	0.4962
	p-Value	0.7480	0.5650	0.0000	0.6480	0.0020	0.3380	0.0000	0.7220	0.0110	0.9000	0.8980	0.0000
Wiggle rightward self-interest	Estimate	--	--	--	--	--	--	--	0.3175	(0.0523)	--	--	--
	Std Error								0.5528	0.7595			
	p-Value								0.5660	0.9450			
Wiggle centerward self-interest	Estimate	--	--	--	--	--	--	--	(0.4232)	(0.1830)	--	--	--
	Std Error								0.6213	0.8538			
	p-Value								0.4960	0.8300			

Table 22 Test Treatment Ambiguity Wiggle vs. Control

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