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Examining the Effects of Verbal Stimuli on Cooperative Responding under a Competing Financial Contingency

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by

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Abstract

Motivative augmentals are verbal stimuli (i.e., rules), that temporarily increase or decrease the degree to which previous established reinforcers function for an individual (Ju & Hayes, 2008). Implicit relational responses are brief, immediate, relational responses (BIRRs) occurring with respect to specific classes of verbal stimuli present in an individual's environment (Dymond & Roche, 2013). In contrast, explicit responses are referred to as extended and elaborated relational responses (EERRs) that occur in the absence of time pressure. The Implicit Relational Assessment Procedure (IRAP) is a tool designed to assess the strength of one's relational responding history with respect to brief presentations of verbal stimuli. This study examined the effects of IRAP-determined verbal stimuli on cooperative responding under a competing financial piece-rate contingency within a simulated work task. The degree to which IRAP-determined verbal stimuli functioned as motivative augmentals to increase participant cooperative responding will be discussed.

Table of Contents

List of Tables

List of Figures

Introduction

Language is a powerful social tool. A few words expressed by an organizational leader, in a specific context, can have negative or positive effects on the group's unity and success. From a behavior scientific perspective, the power of words on the world's diverse social communities is found in a statements' *shared stimulus functions* (Houmanfar & Johnson, 2004; Houmanfar, Rodrigues, & Smith, 2009; Kantor, 1982). Kantor (1982) defines "shared stimulus functions" as "cultural stimulus functions" (p. 246). He notes, "To differentiate between cultural and noncultural stimulus-response factors it is only necessary to analyze the specific details involved in the behavioral histories of organisms in their various environments. In cultural behavior fields the identifying factor is the question of *sharing* or participating in common situations" (p.246). In other words, "shared stimulus function" is when a specific stimulus object functions relatively equally for one individual as it does for another individual under similar contextual circumstances, due to both individuals having a similar enough history of reinforcement with that stimulus object.

An example of shared *verbal* stimulus function within an organizational setting may involve two employees that grew up in similar social communities and have experienced similar histories of reinforcement. Employee A and employee B have learned through their individual work histories that rules provided by their supervisor are likely to match the contingencies of the workplace. Therefore, employee A and employee B's behavior tend to quickly come under the stimulus control of the instructions provided by their supervisor. Given that both employees respond similarly in the presence of their supervisors' instructions, the stimulus function between employee A and employee B is *shared*. In contrast, employee C may have a drastically different

work history where rules provided by their supervisors in the past have been frequently inaccurate with the contingencies of the workplace. Employee C's behavior may be less likely to come under control of their supervisor's instructions. If employee C responds noticeably different than employee A and B to their supervisors' instructions, there is likely a *lack* of shared stimulus function between the employees with respect to their supervisors' instructions.

Shared verbal stimulus function likely evolved in human phylogeny out of a necessity for small groups to survive and adapt to their changing environmental conditions. Modern evolutionary scientists examine evolutionary processes from four dimensions of inheritance: genetic, epigenetic, behavioral, and cultural (i.e., symbolic) (Jablonka & Lamb, 2005). It is posited that cultural—or symbolic communication—repertoires among humans emerged due to survival advantages for a eusocial species (Hayes & Sanford, 2014). The ability to cooperate is a human adaptation that evolved within small groups prior to the development of language and cognition. Cooperation among humans then set the conditions under which a *shared* symbolic communication repertoire (i.e., language and cognition) would be selected within human phylogeny.

Despite our genetic and epigenetic endowment to engage in cooperative, eusocial behavior, cultural drift may occur: "when such original survival contingencies can no longer serve as standards against which to evaluate the adequacy of practices, practices become susceptible to other influences" (Houmanfar & Johnson, 2004, p.125). In workplace environments, the influences that are most likely shaping an individuals' practices are the workplaces' "organizational stimuli" (Houmanfar, Rodrigues, & Smith, 2009, p. 259). These stimuli are the rules, policies, statements, and other members within the organization. When

effective, “organizational rules are institutional stimuli that correspond to a *shared* response from a group” (Houmanfar, Rodrigues, & Smith, 2009, p. 267).

When a lack of shared stimulus function is present in leaders’ communication processes, the likelihood for miscommunication to occur between individuals is increased. Research has shown that miscommunication or “inaccurate rules” in an analog work setting increases the frequency of and duration of rumor behavior, as well as, decreases levels of productivity (Houmanfar & Johnson, 2004; Smith, Houmanfar, & Denny, 2012). There are also safety risks involved with a lack of shared stimulus function. For example, faulty group communication has been correlated with increases in the frequency of commercial airliner crashes, increases in the frequency of environmental disasters from energy providers, and increases in the frequency of medical errors within hospital settings (Alavosius, Houmanfar, Anbro, Burleigh, & Hebein, 2017; Maraccini, Houmanfar, Kemmelmeier, Piasecki, & Slonim, 2018). Many of these instances result in death or long-term injury for both employees and for consumers of these organizations’ aggregate products.

A lack of shared stimulus function within a group becomes additionally problematic when common pooled resources (e.g., clean water, energy, food, etc.) are limited. Individuals may be more likely to act with respect to their own self-interests (e.g. selecting a smaller, sooner, individual reward), rather than conserving common pool resources (e.g. selecting a larger, later, group reward). In the absence of clearly defined and accurately executed group policies that promote the conservation of common pool resources for all, we run the risk as an evolving global society of rapidly depleting our planet’s common pool resources (Wilson, Ostrom, & Cox, 2013; Wilson, Hayes, Biglan, & Embry, 2014). However, a promising solution to prevent human error, increase productivity, and foster a culture of cooperation may be through behavior scientific

investigations of shared stimulus function, particularly of the verbal sort. Therefore, a discussion on Relational Frame Theory, a modern behavioral theory of language is warranted.

Relational Frame Theory

Relational Frame Theory (RFT) is a contextual behavioral theory of language and cognition rooted in modern multidimensional evolutionary theory (Hayes & Sanford, 2014; Wilson, et al., 2014). From an RFT perspective, verbal behavior is a generalized operant class of derived relational responding (DRR; Hayes, Barnes-Holmes, & Roche, 2001). DRR is a behavioral process by which individuals establish a relation between two stimuli through direct-acting conditioning processes in one direction, which then results in a derived relation between those two stimuli in another direction (Hayes, et al., 2001). What makes stimuli verbal in these contexts is that their function is based on arbitrary applicability (Hayes, et al., 2001). The relations that are derived are not dependent solely on the formal properties of the stimuli (shape, size, color, texture, sound, etc.), rather they are primarily dependent on the relationship between the stimuli and the contextual control of the present situation. A relational frame is a specific class of arbitrarily applicable relational responding that has the features of three types of relational responding: mutual entailment, combinatorial entailment, and transformation of stimulus function (Hayes, et al., 2001). Some examples of relational frames are coordination (sameness), opposition, distinction, comparison, hierarchical, temporal, spatial, and deictic (e.g., perspective taking) (Hayes, et al., 2001).

Mutual entailment is "a relation between two events [which] involves responding to one event in terms of the other and vice versa" (Hayes, et al., 2001, p.29). For example, if the verbal stimulus "cooperation" is historically taught as being "good." Then without explicit training, the verbal stimulus "good" will be functionally equivalent to the verbal stimulus "cooperation" in

relevant contexts. Combinatorial entailment is a relation "in which two or more stimulus relations (trained or derived) mutually combine" (Hayes et al., 2001, p. 30). For example, if "cooperation" is historically taught as "good" and "good" is also taught to be equivalent to "success", then one may derive "cooperation" as being the same as "success." When adding in the social and grammatical conventions of language, an employee may derive the rule: "Cooperation is the key to success" or "The more I cooperate, the more successful the company will be."

Transformation of stimulus functions "refers to the behavioral phenomenon whereby a stimulus acquires the function of another stimulus with which some kind of relational responding has been established" (Smith, 2013, p.10). In other words, based on the current environmental circumstances, a contextual cue is present that *transforms* or alters the function of a stimulus participating within a relational frame. For example, if an employee has generated the rule, "Cooperation is the key to success" this rule may be functionally transformed by contextual cues provided by new management. Management may tell the employee, "Our numbers are down and we need everyone staying on task and focused on meeting their individual quota by new deadlines." This statement may then transform the stimulus function of the stimulus "cooperation" for the employee and they may derive a new rule: "Cooperation is no longer the key to success; independence is more important now." The employee's derived rule may then influence their time and choice allocation at work, despite the employee's history of reinforcement for cooperating at work previously.

Rule-Governed Behavior

From an RFT perspective, there are three classes of rule-governed behavior: pliance, tracking, and augmenting (Hayes et al., 2001). Pliance is defined as "rule-governed behavior

under the control of apparent socially mediated consequences for a correspondence between the rule and relevant behavior" (Hayes, Zettle, & Rosenfarb, 2004, p. 203). For example, a manager tells a new employee, "You need to process 25 orders before going on your morning break." If the employee then processes exactly 25 orders every day before going on their break and reports that they do so based on the instructions given by their manager, they would be engaging in pliance. The employee processes *exactly* 25 orders each day and then takes their break, not because there are always 25 orders in their morning bin, but because they are operating under the socially mediating consequences provided by their supervisor.

Tracking is defined as "rule-governed behavior under the control of the apparent correspondence between the rule and the way the world is arranged" (Hayes et al., 2004, p. 206). For example, another employee may generate the rule, "After I've processed a bin's worth of orders, I will take my morning break." The amount of orders in their bin may vary from day-to-day. However, the employee in this situation is acting with respect to the way the world is arranged such that, the sight of an empty bin acquires the discriminative stimulus function for "break time" behavior. If the employee were asked to verbally identify the criteria for going on a morning break, and they respond, "I process all the orders in my morning bin and once I see the bin is empty, I give myself a break." This would be an instance of tracking and not pliance, because they are deriving rules for when they can go on a break based on how the world is arranged (i.e., the sight of an empty bin), not based on the rules given to them by socially-mediated management.

The third type of rule-governed behavior is referred to as "augmenting" and is categorized into sub-two types: formative augmenting and motivative augmenting. Augmenting is defined as "rule-governed behavior under the control of apparent changes in the capacity of

events to function as reinforcers or punishers" (Hayes et al., 2004, p. 206). Formative augmentals are rules that influence behavior "due to relational networks that establish given consequences as reinforcers or punishers" (Hayes, et al., 2001, p. 110). For example, when employees go on their break, they may spend time outside and notice the litter that collects in the natural landscape surrounding their building. Their manager may tell them, "For every item of trash collected on your break, the company will give you a 'Green Environment Token' that you can exchange for different prizes." If collecting 'Green Environment Tokens' acquires a reinforcing function (i.e., increases trash collecting behavior), the rule provided by their manager would be considered a formative augmental, in the sense that it created the conditions under which one would derive that the act of exchanging trash for green tokens as a verbally reinforcing activity.

Motivative augmentals are rules that influence behavior "due to relational networks that temporarily alter the degree to which previously established consequences function as reinforcers or punishers" (Hayes, et al., 2001, p. 109). For example, if the manager in the above example sees a decrease in trash collecting behavior a month after they provided the original rule, they may go outside during breaks and say, "Remember, you can earn 'Green Environment Tokens' by collecting trash." If the employees temporarily increase the frequency of their trash collecting behaviors, immediately following the presentation of the manager's rule, then the manager's rule would be functioning as a motivative augmental. The presentation of the augmental (i.e., the rule), sets the occasion for the transformation of stimulus function. Items that have a history of reinforcement for being labelled as "trash" are momentarily placed in a frame of coordination with "Green Tokens" and "company prizes" via the behavioral process of arbitrarily applicable derived relational responding. The derived reinforcement effects for picking up a piece of trash and exchanging it for a Green Token are momentarily increased.

One could make the argument that employees pick up trash to "comply" with the source of the rule—their boss. Another might argue that employees pick up trash because the rule their boss tells them increases their attending response, making them more likely to "track" the opportunities to pick it up. Hayes, et al. (2004) note, "Augmenting rarely exists in pure form—it is usually mixed with pliance or tracking. Each of these can be affected by augmentals because they each involve implied or specified consequences" (p. 208). Given the complexity of the everyday example provided above, the ability to parse out these technical distinctions in laboratory settings is a required next step for these theoretical classifications of rule-governed behavior in contextual behavioral science.

Experimental Analysis of Rule-Governed Behavior

Although the theoretical distinction between pliance, tracking, and augmenting was made by Zettle and Hayes in 1982, the experimental analysis supporting these terms is extremely limited. Kissi, Hughes, Mertens, Barnes-Holmes, De Houwer, and Crombez (2017) conducted a systematic literature review for pliance, tracking, and augmenting to determine, "whether these concepts refer to distinct functional classes of behavior; and how these concepts have been operationalized in experimental (behavior-analytic) research" (p. 683). A key motivational factor for conducting the literature review was due to the "widespread theoretical and therapeutic appeal" these terms have received in publications since 1982, with a notably low number of publications on the experimental analysis of these terms (p. 683). The authors only included peer-reviewed publications that "used an experimental design, centered on operant learning in humans" and those that had "clearly stated in the abstract or introduction that it aimed at investigating pliance, tracking, and/or augmenting" (p. 687).

Results of Kissi, et al. (2017) concluded that only nine peer-reviewed publications, explicitly investigating pliance, tracking, and/or augmenting were identified, describing 14 experimental studies. Of the 14 studies found, "No study was identified that investigated motivative augmenting" (p. 691). Given that these terms were introduced nearly four decades ago, Kissi, et al. (2017) concluded the following from their results: (a) research specifically investigating pliance, tracking, and augmenting is limited, (b) based on the experimental methodologies that were found "it is difficult to determine the extent to which the concepts of pliance, tracking, and augmenting allow for relatively precise experimental analyses of distinct functional classes of behavior," and (c) the most studied concepts (pliance and tracking) "have been operationalized using a limited set of procedures" (p. 689).

Despite the authors' limited findings, Kissi et al. (2017) noted limitations to their literature inclusion criteria that likely resulted in some studies being discarded that did primarily investigate pliance, tracking, and augmenting. Their inclusion criteria were as follows: "a study was included if it used an experimental design, centered on operant learning in humans…and clearly stated in the abstract or introduction that it aimed at investigating pliance, tracking, and/or augmenting. Concerning the report characteristics, a report was included if it was written in English and was published in a peer-reviewed journal" (p. 687). Only research that was published in peer-review journals between 1982 and 2015 were considered, meaning theses and dissertations not published in peer-review journals were discarded. Some studies found "referred to their findings as instances of pliance, tracking, and/or augmenting" in their discussion sections, but did not make it explicitly clear in the abstract or introduction of their papers that those classes of behavior were intended to be investigated. Lastly, the authors note the possibility of "much more experimental work on this topic [being] conducted but simply has not been

published due to null findings" (p. 691). Given the constrained inclusion criteria for Kissi et al., (2017), a few studies at the University of Nevada, Reno were not considered.

One peer-reviewed publication that was not included in their review was Ju & Hayes (2008). Ju & Hayes (2008) trained arbitrary symbols to function equivalently as specific consequential events in a computerized choice-task for college students. They then compared participants' rate of responding to the arbitrary symbols and rate of responding to other discriminative stimuli present on the screen. Results found that arbitrary stimuli trained in equivalence relations with reinforcing consequences "produced motivative effects...that were over and above the effects seen with discriminative stimuli established in the same experiment" (p. 360). The experimental training procedure conducted with arbitrary stimuli demonstrated the processes by which augmentals may be *formed* in an individual's relational repertoire and demonstrated those arbitrary stimuli's ability to motivate (or temporarily increase) responding. Although the authors provided the basic literature a starting point for investigation, there is little applied utility in establishing *new* relational repertoires from contextually arbitrary symbols and sounds in a workplace environment. For researchers attempting to capitalize on already acquired relational repertoires in organizational settings, the Implicit Relational Assessment Procedure (IRAP) may be a promising institutional stimuli selection tool.

The IRAP as a Selection Tool for Motivative Augmentals

The IRAP is a tool "that assesses relational responding on the part of a human participant" (Smith, 2010, p.16). This assessment tool was conceptualized in 2006 by Barnes-Holmes and colleagues and has undergone a handful of iterations and modifications since its conception (Barnes-Holmes, et al., 2006; Jackson, et al., 2016). The theoretical foundation for the IRAP is based in RFT, specifically the Relational Elaboration and Coherence (REC) model

(Barnes-Holmes, et al., 2010). The REC model views relational responses "like all behaviors, [they] unfold across time. Thus, when a stimulus is encountered, a relational response may occur relatively quickly and be followed by additional relational responses. These additional responses may occur toward the stimulus itself or toward the initial response to the stimulus. With sufficient time, these additional relational responses will likely form a coherent relational network" (p. 102). In other words, relational responses to stimuli are contingent not only on the direct history we've had with those stimuli, but also by the derived relational responding to those stimuli that emerge via a history with frames of coherence.

The REC model categorizes arbitrary applicable relational responding (AARR) into two categories: brief, immediate, relational responding (BIRRs), or responses that occur consistently under time pressure and extended, elaborated relational responding (EERRs), or responses that occur in the absence of time pressure (Hughes & Barnes-Holmes, 2013). Although it may appear as if BIRRs reliably precede EERRs in the same frame of coordination (i.e., equivalence class), Hughes & Barnes-Holmes (2013) note, "it is important to appreciate that both are behavioral patterns, and thus they may interact in a dynamic manner" (p. 102).

Jackson, Williams, Hayes, Humphreys, Gauthier, and Westwood (2016) used the IRAP to select "reinforcer-focused statements" for undergraduates enrolled in an indoor cycling class (p.50). IRAP stimuli were categorized into three stimuli lists: aesthetics reasons for exercise (i.e., 'tone muscles'), health reasons (i.e. 'reduce risk of cancer'), and aesthetic + health reasons. Participants' motivational statements were then selected from the IRAP stimuli list that had the highest positive valence (i.e., highest IRAP score). In the experimental phase, while participants were exercising on an indoor cycling machine, they were presented with either no statements (baseline), IRAP-determined statements, or "instructions focused on the proper topography of

exercise" (p.54). When presented with the individualized, IRAP-vetted list of phrases, participants temporarily increased the intensity of their participation in their exercise classes more so than the intensity of exercise during baseline or the instructional condition. Intensity was measured by participants' heart rates. The authors note that the IRAP version used at the time was "not designed to identify specific items" (p. 54). The authors were only able to determine their motivational statements at the list level due to the limitations of an older version of the IRAP. They note, "...being able to assess at the individual item level would allow for greater use of the IRAP in applied settings" (p. 56).

Rafacz, Houmanfar, Smith, & Levin (2019) examined the differential effects of IRAP selected statements on cooperative responding under profit-share and piece-rate financial conditions within an analog work task. Experiment 1 utilized a variation of the IRAP to identify stimuli that might function as motivative augmentals. This iteration of the IRAP allowed for the assessment of stimuli at the individual response class level and did not require stimuli to be grouped together at a list level (Levin, 2010). Eleven undergraduates completed the IRAP using stimuli classified as being either cooperative or independent. The two cooperation words with the highest positive valence ("partnership" and "cohesive effort") and the two independent words with the highest positive valence ("independent" and "self-reliant") were selected for Experiment 2.

In Experiment 2, a different group of students (20 undergraduates) completed the IRAP and based on their list level scores were classified into three groups (pro-cooperation, pro-independence, or undifferentiated). To control for pre-existing social biases, participants were then equitably sorted into two experimental groups (10 students per experimental procedure). Each group then completed a simulated medical data entry task and were presented with group-

level, IRAP-determined motivational stimuli (from Experiment 1) under profit-share or piece-rate financial contingencies. Results indicated that 8 out of 10 exposed to a financially-neutral contingency (profit-share) responded to the motivational statements as motivative augmentals. Whereas, 5 out of 10 exposed to a financially-competing contingency (piece-rate) responded to the motivational statements as motivative augmentals.

Candido (2013) provided an extension of Rafacz, Houmanfar, Smith, & Levin's (2019) findings. The purpose of Candido's research was to determine the effects of three variations of motivational statement customization on cooperation and independent responding under two financial contingencies for a total of six experimental groups. Three of the groups were exposed to pro-individual statements under financially neutral contingencies (profit-share). Three of the groups were exposed to pro-cooperation statements under financially competing contingencies (piece-rate). Results from both financial contingencies (profit-share and piece-rate) demonstrated more of a motivative augmental effect for statements that were selected based on individually-determined IRAP scores. These results suggest that the IRAP may be a promising selection tool for stimuli that function as motivative augmentals. In other words, it may demonstrate the ability for the IRAP to capture at the individual-level, an individual's history of reinforcement with specific verbal stimuli.

For the third-party determined stimuli, motivational statements were selected based off a different group's IRAP results from a previous study. The third-party group were undergraduates at the same institution as the experimental groups in Candido (2013). However, both the group under the profit-share contingencies and the group under the piece-rate contingencies responded at chance levels to the motivational statements presented on the screen, indicating a weak motivative augmental effect. These findings additionally support the likelihood of the IRAP

being having predictive utility for stimuli that function as motivative augmentals. By demonstrating that third-party words do not function as motivative augmentals and IRAP-determined stimuli do function as motivative augmentals, it highlights the complexity and uniqueness of each participant's history of reinforcement with derived relational responding and the ability for the IRAP to identify those historical differences.

From an experimental perspective, there were limitations to the methodology of these studies. Specifically, Jackson, et al. (2016), Rafacz, Houmanfar, Smith, & Levin (2019), and Candido (2013) all examined the effects of IRAP-determined stimuli using participants' highest IRAP scores or said another way, stimuli that had the highest valence. None of the experiments compared the effects of high valence IRAP scores with low valence IRAP scores. Therefore, it is difficult to determine with precision, the predictive utility of the IRAP as a motivative augmental selection tool.

From an organizational perspective, there is also little practicality in reliance on a tool that can only examine one individual's personal history of reinforcement. Leadership professionals are often responsible for communicating a message to many individuals from differing backgrounds. As mentioned earlier, effective communication between two individuals or more requires the ability to identify the shared stimulus function of verbal behavior. In Candido (2013), one group completed the simulated medical data entry task under financially-neutral contingencies (profit-share) and were exposed to group-level, IRAP-determined, pro-individual statements. All three participants increased independent responding when exposed to the pro-individual statements, indicating a motivative augmental effect.

Another group completed the simulated medical data entry task under financially-competing (piece-rate) contingencies and were exposed to group-level, IRAP-determined, pro-

cooperation statements. Unfortunately, only 1 of the 3 participants increased cooperative responding when exposed to the pro-cooperation statements. From an organizational perspective, it would be advantageous to demonstrate the motivative augmental effect under financially-competing contingencies, because organizational leaders would have an alternative means of increasing prosocial behavior among employees beyond the limitations of monetary compensation. It would also further demonstrate that the IRAP can be utilized as an assessment tool for identifying shared verbal stimulus function. Therefore, the purpose of this study was to provide an extension of Candido (2013) by examining the effects of both high-valence and low-valence, IRAP stimuli on cooperative responding under a financially competing contingency within an analog work task.

Pilot Study

Explicit Survey for IRAP Stimuli Selection

IRAP researchers have highlighted the importance of stimuli selection for determining the predictive validity and internal reliability of the tool (Dymond & Roche, 2013). However, no studies to date have provided a systematic and objective method for IRAP stimuli selection. Given the limitations in the current literature, a three-question, explicit, online Qualtrics© survey was generated to provide a more systematic and objective approach to stimuli selection. The survey was distributed to 355 undergraduate students at the University of Nevada, Reno during the Fall 2016 semester. Participants were instructed to rank a list of words from strongest (1) to weakest (10) that best described the statements: "conforming with others," "working with others," and "working alone" (see Appendix A). Participants were provided with extra credit (i.e., 1 SONA credit) for completing the survey. The top four words rated to "best describe" the

statements related to cooperation (i.e., "working with others") and independence (i.e., "working alone") were used as the target stimuli in an IRAP for the pilot study to assess participants' implicit relational responding repertoires with respect to cooperation and independent response classes. Results of the explicit survey informed the decision to include "team player," "cooperation," "group effort," and "collaboration" as the stimuli for the cooperation target stimuli list and "independent," "on my own," "flying solo," and "self-sufficient" for the independent target stimuli list (see Appendix B).

Pilot Participants and Setting

Participants included three community members of Reno, NV. One participant was a graduate student at the University of Nevada, Reno. One participant was an undergraduate student at the University of Nevada, Reno. The third participant had recently graduated with their undergraduate degree from the University of Nevada, Reno. None of the participants reported having previously participated in studies using a simulated EKG medical data entry task and none reported having had a previous history of arthritic conditions and/or repetitive stress injuries. No formal compensation procedure occurred for the participants' involvement in the pilot study.

The experimental task was conducted in one, windowless room at the University of Nevada, Reno containing two desks, and two PC desktop computers. Each computer was also equipped with Visual Studio 2016, a programming software that phase 1 (the IRAP task) and phase 2 (the simulated medical data entry task) operated from. Although there were two computers, only one participant was present at any given time.

Materials

The pilot study was comprised of two phases. Upon arrival for phase 1, participants were asked to complete the Inclusion Criteria form (see Appendix C). If the participant was deemed eligible for the study, the participant was asked to sit at a computer while the researcher read to them the IRAP instructions (see Appendix D). The participant then completed the IRAP. The IRAP took on average, approximately 15 minutes to complete for all 3 participants. If the participant was unable to successfully complete the IRAP, they were asked to retake the assessment up to three more times. If the participant had not successfully completed the IRAP by the fourth attempt, the participant was not invited to participate in phase 2 of the study. All 3 participants completed the IRAP within the stated inclusion criteria.

In phase 2, the participants sat at a computer while the researcher read to them the medical data entry task script (see Appendix E). Each participant then completed a practice phase of the medical data entry task, which took approximately 6 minutes (4, 90-second conditions) (see Table 1). The participant then completed the experimental phase of the medical data entry task, which took approximately 21 minutes (7, 3-minute conditions) (see Table 2). Participants were then asked to complete a post-experiment questionnaire (see Appendix F).

Experimental Design

After all three participants successfully completed the IRAP (phase 1), their IRAP scores were aggregated (i.e., averaged). The group-level IRAP data were aggregated immediately following the third participant's completion of phase 1. The group of participants were then scheduled to return to the lab within two weeks (14 days) to complete the simulated medical data entry task (phase 2). All participants were exposed to the same within-subject, alternating

treatment design (ABACD^{1}CD^2) in phase 2. The motivational statements presented to each participant were also the same.

In phase 2, participants were first exposed to the financial contingencies in the absence of written statements (ABA). Condition A was a financially competing, piece-rate (PR) condition in the absence of written statements presented on the screen. In Condition A, every time the participant selected the "Work Alone" button and accurately completed a data-entry form, they received $0.02, indicated in the "Revenue" box at the bottom of the screen (see Appendix G). If the participant selected the "Fix Partner Errors" button, no monetary compensation was displayed on the screen, regardless of the accuracy and productivity of their performance. Condition B was a pay-for-time (PFT) condition in the absence of written statements presented on the screen. In Condition B, regardless of how many times they selected the "Work Alone" or "Fix Partner Errors" button or how many data entry forms they accurately completed, they earned a flat rate of $0.13. However, they did not immediately see any monetary compensation at the bottom of the screen. Rather, they saw their earnings at the end of the condition on the feedback screen (see Appendix H). For the pilot study, participants were told that they would not actually receive any money at the end of their session. The purpose of the ABA conditions were to expose the participants to the financial contingencies of the simulated EKG medical data entry task in the absence of written statements, which provided the opportunity for participant button selection responding to come under the influence of the financially competing, piece-rate contingency that was held constant during the CD^{1}CD^2 conditions.

The last 4 conditions of the pilot study were CD^{1}CD^2. Conditions C, D^1, and D^2 were the same financial-contingency as specified for Condition A (piece-rate). Condition C included the presentation of a neutral statement (i.e., "Staying on task is highly valued"). Condition D^1 and D^2

included the presentation of group-determined motivational statements (based on the IRAP results for that group). The word identified as having the highest positive valence (i.e., highest positive IRAP score) at the group-level in phase 1, was included as the first motivational statement presented in Condition D^1 (i.e., "Collaboration is highly valued."). The word identified as having the second highest positive valence at the participant group-level in phase 1, was included as the second motivational statement presented in Condition D^2 (i.e., "Group-effort is highly valued."). The decision to select statements with the first and second highest positive valences for Condition D^1 and D^2 was based on the methodology used in Candido (2013).

Independent Variables

The independent variables included the financial contingencies (piece-rate and pay-for-time) and the addition of either motivational statements (as determined by the IRAP) or neutral statements presented on the screen. Based on Rafacz, Houmanfar, Smith, & Levin (2019) and Candido (2013), it was predicted that participants would be more likely to select the "Work Alone" button when exposed to the piece-rate contingency in the absence of verbal statements (Condition A). It was also predicted that participants would be more likely to distribute their selection between the "Work Alone" (WA) button and "Fix Partner Errors" (FPE) button more equitably when exposed to the pay-for-time contingency in the absence of verbal statements (Condition B).

Following the initial conditions (ABA), participants were then presented with a neutral statement at the top of the screen (Condition C), to control for the presentation of any written statement functioning as a potential motivative augmental for engaging in variable responding. In other words, Condition C was presented prior to Condition D^1 to assess for any change in conditions effects. The statements in Condition C were deemed "neutral" based on their

presumed motivational functions for increasing cooperative responding. It was also predicted that the presence of these statements were likely to momentarily increase attention to the task but were "neutral" in their influence on selecting the WA button versus the FPE button. Conditions D^1 and D^2 presented group-determined motivational statements. It was predicted that Conditions D^1 and D^2 would momentarily increase the likelihood of participants selecting the FPE button. To ensure participants attended to the written statements on the screen, a small message box appeared on the screen that participants had to click out of to complete the data entry task. After the message box was removed, the written statement for the respective condition scrolled across the top of the screen every time the participant was presented with the option to select between the FPE button and the WA button for the entire 3-minute condition (i.e., high frequency presentations of the verbal stimuli). At the start of each new condition, a new message box (i.e., motivational statement or neutral statement) appeared and the participant needed to click out of it to continue.

Dependent Variables

The primary dependent variables included the frequency of WA and FPE button selections across each 3-minute condition. The secondary dependent variable considered was the post-experiment questionnaire (see Appendix F).

Pilot Procedure: Phase 1

When a participant arrived, the researcher asked them to complete the Inclusion Criterion Form and read them a form on consent (see Appendix C). The researcher then read the IRAP instructions script (see Appendix D). The researcher then opened the IRAP assessment and instructed the participant to follow the directions provided by the assessment. The researcher then left the room to avoid creating unnecessary distraction while the participant completed the

IRAP. The IRAP assessed for participant's current levels of relational responding with respect to the cooperation target stimuli list and independent target stimuli list (see Appendix I for IRAP screenshot and Table 3 for target stimuli list). The IRAP assessment took approximately 15 minutes to complete.

IRAP Inclusion Criteria

For participants to successfully complete the IRAP, they must have been able to respond under or at an average of 3 seconds and with at least 75% accuracy for both the practice block and the 6 testing blocks. If the participant was unable to pass the completion criteria by their fourth attempt, they were omitted from the study. If the participant could pass the completion criteria by the fourth attempt, the researcher scheduled them to return to the lab within 14 days for phase 2.

Pilot Procedure: Phase 2

When a participant arrived, the researcher read the EKG Medical Data-Entry Task script (see Appendix E). The researcher then prepared the practice trial sequence and left the room. The participant then went through the series of practice trials for the medical data entry task. The practice trials consist of 90-second timings of Condition A and Condition B (see Table 1; ABAB). The practice trials took approximately 6 minutes to complete (4, 90-second conditions).

Upon completion of the practice trials, the researcher returned to the room to setup the experimental sequence ($ABACD^1CD^2$). The participant then went through the experimental sequence for the data-entry task. The experimental sequence took approximately 21-minutes to complete (7, 3-minute conditions). Following the completion of the experimental sequence, the researcher asked the participant to complete the Post-Experiment Questionnaire (see Appendix

F). After the post-experiment questionnaire was completed, the researcher offered the participant a Participant Debriefing Form (see Appendix J).

The purpose of the pilot study was to examine the effects of group-level, aggregated, IRAP scores as the criterion for determining which motivational statements would be selected and embedded into the D conditions would have on participant FPE button selection (i.e., cooperation) while concurrently being on a piece-rate payment contingency for WA button selection (i.e., a competing financial contingency) during a simulate medical data entry task. Given that all three participants were considered one group, the aggregated IRAP scores will be discussed first. Next, individual patterns of responding within phase 2 will be reviewed. The discussion of phase 2 for each participant will begin with a review of the results during the ABA conditions, followed by a discussion on that individual's responding during the CD^1CD^2 conditions.

Pilot Results

Pilot Group IRAP Results

Upon the successful completion of the IRAP for all three participants, each participants' individual scores were calculated (see Figures 1-3). Next, all three participants' individual IRAP scores were averaged and a new graph was created (see Figure 4). As shown in Figure 4, the motivational stimulus, "Collaboration", was determined to have the highest positive valence with a score of 1.105 (see Table 4). Therefore, this stimulus was used to create the motivational statement presented during the D^1 condition. The motivational stimulus, "Group Effort", was determined to have the second highest positive valence with a score of 0.576. Therefore, this stimulus was used to create the motivational statement presented during condition D^2.

Pilot Participant 1

In phase 2, results for Participant 1 are represented in Figure 5. Data represent the frequency of WA and FPE button selections across each 3-minute condition. In the ABA conditions, this participant's responding did not seem to come under the influence of the financial contingency in condition B (pay-for-time) indicated by 0 selections of the FPE button. However, in condition A, the participant's button selection responding did appear to come under the influence of the piece-rate financial contingency for selecting the WA button. There did not appear to be a change in condition effect during the first presentation of condition C (NS1). During condition D^1 (MS1), there was a motivative augmental effect, indicated by an increase in FPE button selections and a decrease in WA button selections. However, there did not appear to be a motivative augmental effect for the presentation of the second motivational statement in condition D^2 (MS2).

Pilot Participant 2

Results for participant 2 are represented in Figure 6. Data demonstrate the frequency of WA and FPE button selections across each 3-minute condition. In the ABA conditions, this participant's button selection responding did come under the influence of the financial contingencies in condition A and in condition B indicated by a higher number of WA button selections in condition A and a higher number of FPE button selections in condition B. There did not appear to be a change in condition effect during the first presentation of condition C. During condition D^1 and D^2, there was a motivative augmental effect, indicated by an increase in FPE selections and a decrease in WA button selections.

Pilot Participant 3

Results for participant 3 are represented in Figure 7. The data show the frequency of WA and FPE button selections across each 3-minute condition. In the ABA conditions, this participant's button selection responding did not come under the influence of the financial contingencies, indicated by a higher number of FPE button selections throughout each condition. There did not appear to be a change in condition effect during the first presentation of condition C. The data in condition D^1 and D^2 demonstrate a lack of a motivative augmental effect on the FPE button selection.

Pilot Limitations

The pilot study's original methodology was designed to examine the effects of aggregated, group-level IRAP scores as a criterion for motivational stimuli selection on cooperative responding under a competing financial contingency within an analog work task, such that *shared augmental functions* between individuals within a group could be identified. The methodology used in Candido (2013) was replicated and only the two statements with the highest positive IRAP scores were selected to examine this effect.

Based on the pilot methodology, it is unclear if shared function between participants was clearly identified due to the averaging of IRAP scores prior to the implementation of phase 2. By averaging scores *prior* to the introduction of the work task, an individuals' level of sensitivity in responding to IRAP-determined motivational statements may have been reduced. Additionally, it is unclear if participants would respond similarly to low valence IRAP stimuli as they would the high valence IRAP stimuli (e.g., an IRAP score of -0.5 compared to an IRAP score of +0.5). Additionally, motivative augmentals are defined as stimuli that "temporarily alter" the reinforcement effect of a response, via derived relational responding processes (Hayes, et al.,

2001, p. 109). It would be advantageous to compare high frequency presentations and low frequency presentations of verbal stimuli on behavior, to better understand the temporality of this augmental effect, in relation to the frequency of stimuli presentation. In other words, identifying if an increased frequency in stimuli presentation increases the momentary effectiveness of the motivative augmentals and increases the maintenance of cooperative responding under financially competing contingencies.

Therefore, an alternative methodology was utilized in the experimental study. In the experimental study, IRAP stimuli were selected at the individual-level, rather than the aggregated, group-level to better understand the predictive utility of the IRAP as a stimuli selection tool. Participants were also exposed to all four IRAP stimuli in one of two sequences (i.e., MTL or LTM) to control for the effects that high valence IRAP scores may have on cooperative responding when compared to low valence IRAP scores (i.e., order effects). Lastly, half of the participants were exposed to high frequency presentations of the motivational verbal stimuli (i.e., MTL^{H} and LTM^{H}) and half of the participants were exposed to low frequency presentations of the motivational verbal stimuli (i.e., MTL^{L} and LTM^{L}) to better understand the temporary effectiveness of motivative augmentals on responding.

Experimental Study

Explicit Survey for IRAP Stimuli Selection

The same explicit survey results from the Fall 2016 semester that were used to determine stimuli selection in the pilot study were used to determine the cooperation and independent target stimuli lists for the experiment. As previously mentioned, results of the explicit survey informed the decision to include “team player,” “cooperation,” “group effort,” and “collaboration” as the

target stimuli for the cooperation target stimuli list and “independent,” “on my own,” “flying solo,” and “self-sufficient” as the independent target stimuli list in the IRAP (see Appendix B).

Participants and Setting

Participants included forty undergraduate students at the University of Nevada, Reno. Individuals who had previously participated in studies using a similar simulated EKG medical data entry task or had a previous history of arthritic conditions and/or repetitive stress injuries were omitted from participating in the study. Participants were compensated with extra credit (i.e., 3 SONA credits). Participants also received monetary compensation immediately following the completion of phase 2 of the study and the monetary rate was dependent upon how much revenue each individual participant earned during the phase 2 analog work task.

The experimental task was conducted in two different windowless rooms at the University of Nevada, Reno. Twenty of the participants completed the study in a windowless room at the University of Nevada, Reno. This room contained four desktop computers, all equipped with Visual Studio 2016 to run phase 1 and phase 2 of the experiment. The other twenty participants completed the study in a room containing two desks and three desktop computers that were equipped with Tobii Pro X2-60 eye tracking hardware and software and Visual Studio 2016. Twenty-five percent of participants completed phase 2 of the experiment with the Tobii Pro X-2 60 operating. The other 75% of participants completed the study without the Tobii Pro X-2 60. Although there were multiple computers in each room, only one participant completed the study during an experimental session.

Materials

The experiment was comprised of two phases. In phase 1, participants first completed the Inclusion Criteria form (see Appendix C). If the participant was deemed eligible for the study,

they were asked to sit at a computer while the researcher read to them the IRAP instructions (see Appendix D). The participant then completed the IRAP (see Appendix D for IRAP sample). The IRAP took approximately 15 minutes to complete. If the participant was unable to successfully complete the IRAP, they were asked to retake the assessment up to three more times. If the participant successful completed the IRAP by the fourth attempt, the participant immediately participated in phase 2 of the study. If the participant was unable to complete the IRAP after the fourth attempt, they were excused from the study. All 40 participants were able to complete the IRAP by the fourth attempt.

In phase 2, the participant sat at a computer while the researcher read to them the EKG medical data entry task script (see Appendix E). The participant then completed the practice phase of the medical data entry task, which took approximately 1 minute (1, 60-second condition) (see Table 5). For 25% of the participants, the researcher then activated the Tobii eye-tracking software and guided those participants through the Tobii eye-tracking calibration process. Upon successful eye-calibration, the participant then completed the medical data entry task, which took approximately 33 minutes (11, 3-minute conditions) (see Table 6). For the 75% of participants that did not have the Tobii eye-tracking software enabled, they immediately began the medical data entry task. All participants then completed a post-experiment questionnaire (see Appendix F).

Experimental Design

After a participant successfully completed the IRAP (phase 1), they immediately began phase 2. All participants in phase 2 were exposed to one of four within-subject alternating treatment designs (see Table 6). All participants were exposed to all four cooperation statements during the D conditions. However, 20 of the participants were randomly assigned to a Most-to-

Least group (MTL) and 20 participants were randomly assigned to the Least-to-Most group (MTL). Additionally, half of the participants in the MTL and LTM groups were exposed to high frequency presentations of motivational statements and half were exposed to low frequency presentations of motivational statements (MTL^H, MTL^L, LTM^H, LTM^L; see Table 6).

In phase 2, participants were first exposed to financial contingencies in the absence of written statements (ABA). Condition A was a competing financial, piece-rate condition in the absence of written statements presented on the screen. In condition A, every time the participant selected the WA button and accurately completed a data-entry form, they received $0.02, indicated in the "Revenue" box at the bottom of the screen (see Appendix G). If the participant selected the FPE button, no monetary compensation was displayed on the screen, regardless of the accuracy and productivity of their performance. Condition B was a pay-for-time condition in the absence of written statements presented on the screen. In condition B, every time the participant selected the WA or FPE button, they did not immediately see any monetary compensation at the bottom of the screen for accurate data-entry forms submitted. Rather, they saw a flat-rate profit of $0.13 at the end of the condition on the Feedback screen at the end of the 3-minute condition. The purpose of the ABA conditions was to expose participants to the financial contingencies of the simulated medical data entry task in the absence of written statements. This provided the opportunity for participants button selection responding to come under the influence of the financial, piece-rate contingency that was held constant during the CDCDCDCD conditions.

The last 8 conditions of the experimental design were CDCDCDCD. Condition C and condition D were the same financial contingencies specified for condition A (piece-rate). Condition C included the presentation of the neutral statement, "Paying attention is highly

valued" for all four C conditions. Condition D included the presentation of four motivational statements. The four motivational statements for condition D included: "Collaboration is highly valued.", "Cooperation is highly valued.", "Group effort is highly valued.", and "Team work is highly valued."

Half of the participants were exposed to the motivational statements in condition D using a LTM sequence and half of the participants were exposed to the motivational statements in condition D using a MTL sequence. Participants' individual cooperation IRAP scores determined the order in which the four motivational statements were presented in the D conditions. For the LTM groups, the motivational statements were presented in order of lowest cooperation IRAP score to highest cooperation IRAP score. For the MTL groups, the motivational statements were presented in order of highest cooperation IRAP score to lowest cooperation IRAP score.

Participants were also randomly assigned to either high frequency presentations of the verbal statements (i.e., LTM^{H} or MTL^{H}) or low frequency presentations of the verbal statements (i.e., LTM^{L} or MTL^{L}), for a total of 4 groups of 10 (see Table 6). For participants in the high frequency groups, they saw the neutral statements and motivational statements at the beginning of every data entry trial for conditions C and D. For participants in the low frequency groups, they saw the neutral statements and motivational statements only one time during the very first trial of each 3-minute condition for conditions C and D.

Independent Variables

The independent variables were the financial contingencies (piece-rate and pay-for-time) and the addition of either motivational statements or neutral statements presented on the screen. Based on Rafacz, Houmanfar, Smith, & Levin (2019) and Candido (2013), it was assumed that participants would be more likely to select the WA button when exposed to the piece-rate

contingency in the absence of verbal statements (Condition A). It was also assumed that participants would be more likely to distribute their selection between the WA button and FPE button more equitably when exposed to the pay-for-time contingency in the absence of verbal statements (Condition B).

Following the initial conditions (ABA), participants were then presented with a neutral statement at the bottom of the screen (Condition C), to control for the presentation of *any* written statement functioning as a potential motivative augmental for engaging in variable responding. In other words, condition C was presented prior to condition D to assess for any change in conditions effects. The statement in condition C was deemed "neutral" based on its presumed motivational function for increasing cooperative responding. It was assumed that the presence of this statements was likely to momentarily increase attention to the task but would be "neutral" in its influence on participants' selecting the WA versus the FPE button. Condition D presented four motivational statements to cooperate. It was assumed condition D would momentarily increase the likelihood of participants selecting the FPE button. To ensure participants attended to the written statements on the screen, a small message box appeared on the screen at the beginning of each 3-minute condition that participants had to click out of to complete the data entry task. After the message box was removed, the written statement for the respective condition scrolled across the bottom of the screen either at a high frequency (i.e., at the start of every trial for the entire 3-minute condition) or at a low frequency (i.e., one time at the beginning of the 3-minute condition). At the start of each new condition, a new message box appeared and the participant had to click out of it to continue. At the end of each condition, participants saw a feedback screen that summarized their total productivity and total monetary compensation (see Appendix G).

Dependent Variables

The primary dependent variables were the frequency of WA and FPE button selections across each 3-minute condition and the probability of selecting the FPE button during the first 3 trials of each 3-minute condition. The secondary dependent variables were a post-experiment questionnaire. Additionally, 25% of participants' frequency and duration of eye-gazing behavior at the WA button, FPE button, and verbal statements were recorded using a Tobii eye-tracker, as a secondary dependent variable.

Procedure: Phase 1

When the participant arrived, the researcher asked them to complete the Inclusions Criterion Form and read them a form on consent (see Appendix C). The researcher then read the IRAP instructions script (see Appendix D). The researcher then opened the IRAP assessment and instructed the participant to follow the directions provided by the assessment. The researcher then left the room to avoid creating unnecessary distraction while the participant completed the IRAP. The IRAP assessed for each participant's current levels of relational responding with respect to the cooperative list and independent list of target stimuli (see Appendix I for IRAP screenshot, and Table 3 for target stimuli list). The IRAP assessment took approximately 12-15 minutes to complete.

IRAP Inclusion Criteria

For participants to successfully complete the IRAP, they had to be able to respond under or at an average of 3 seconds and with at least 75% accuracy for both the practice block and the 6 testing blocks. If the participant was unable to pass the completion criteria by their fourth attempt, they were omitted from the study. If the participant could pass the completion criteria by

the fourth attempt, the researcher then asked them to immediately participate in phase 2 of the study.

Procedure: Phase 2

The researcher read the Medical Data-Entry Task script (see Appendix E). The researcher then prepared the practice condition. The participant then completed the practice condition for the medical data-entry task. The practice condition consisted of 1, 60-second, financially neutral condition with no statements presented on the screen (see Table 6).

Upon completion of the practice condition, the researcher then setup 1 of the 4 experimental sequences (see Table 7). For 25% of participants, the research also set-up the Tobii eye-tracking software. The participant then went through the experimental sequence for the medical data-entry task. The experimental sequence took approximately 33-minutes to complete (11, 3-minute conditions). Following the completion of the experimental sequence, the researcher then asked the participant to complete the Post-Experiment Questionnaire (see Appendix F). After the post-experiment questionnaire was completed, the researcher offered the participant a Participant Debriefing Form (see Appendix J).

Experimental Results

The purpose of the proposed experiment was to examine the effect of verbal stimuli on cooperative responding under competing financial, piece-rate conditions within an analog work task. All participants completed the IRAP—capturing patterns of implicit relational responding (i.e., BIRRs)—and were then exposed to a simulated EKG data-entry task—capturing patterns of explicit relational responding (i.e., EERRs) in the form of WA and FPE button choice allocation. Participants were randomly assigned to four groups of ten. Those in the LTM groups were

presented with motivational statements in condition D, based on their cooperation IRAP scores that were ordered from lowest to highest. Those in the MTL groups were presented with motivational statements in condition D, based on their cooperation IRAP scores that were ordered from highest to lowest. Half of the participants saw the neutral and motivational statements at a high frequency and half of the participants saw the neutral and motivational statements at a low frequency, for a total of four groups (i.e., LTM^{H}, LTM^{L}, MTL^{H}, MTL^{L}).

The primary purpose of this study was to examine the differential effects of neutral stimuli and motivational stimuli on cooperative responding while under a competing financial contingency during a simulated EKG data entry task. Group level IRAP results will first be discussed, followed by a discussion on group level responding during the medical data entry task. To determine if the stimuli presented in condition D functioned as motivative augmentals, the average percent of selecting the FPE button and the probability of selecting the FPE button during the first 3 trials of each condition were analyzed. As secondary measures, eye-gazing behavior and post-experiment questionnaire responses were also analyzed and will be discussed.

Implicit Relational Assessment Procedure

Figure 4 provides a visual depiction of the aggregated, group IRAP results, broken down first into two groups (MTL and LTM) and then broken down into four groups (MTL^{H}, MTL^{L}, LTM^{H}, LTM^{L}). Based on Smith's (2013) classification for IRAP valences as strong, moderate, and neutral, the same criterion will be applied to interrupting the current results. Scores of 0.5 or higher will be discussed as a strong "positive" effect, scores between 0.5 and -0.5 will be classified as "neutral", and scores of -0.5 or lower will be classified as "negative".

Using the Smith (2013) criterion, at the larger group level (MTL and LTM), the LTM group demonstrated a neutral relational responding history with respect to the cooperation stimuli, with

a range between 0.04 and 0.41, and an average of 0.21 at the list level. The LTM group demonstrated a positive relational responding history with respect to the independent stimuli, with a range between -0.34 and 0.75, and an average of 0.31 at the list level. The MTL group demonstrated a neutral relational responding history for the cooperation stimuli, with a range between -0.19 and -0.05, and an average of -0.12. The MTL group demonstrated a positive relational responding history for the independent stimuli, with a range between 0.28 and 0.31, with an average of 0.29.

However, when broken into 4 groups of 10 (see Figure 4), all four groups have a neutral relational responding history to both the cooperation stimuli list and the independent stimuli list. The LTM^{H} group demonstrated a neutral relational responding history with respect to the cooperation stimuli, with a range between 0.04 and 0.62, and an average of 0.29. For the independent stimuli, the LTM^{H} group has a neutral relational responding history, with a range between -0.27 and 0.70, and average of 0.16. The LTM^{L} group demonstrated a neutral relational responding history with respect to the cooperation stimuli, with a range between -0.05 and 0.30, and an average of 0.13. For the independent stimuli, the LTM^{L} group has a neutral relational responding history, with a range between 0.21 and 0.82, and an average of 0.45. The MTL^{H} group demonstrated a neutral relational responding history with respect to the cooperation stimuli, with a range between -0.25 and 0.13, and an average of -0.09. For the independent stimuli, the MTL^{H} group has a neutral relational responding history, with a range between 0.07 and 0.55, and an average of 0.29. The MTL^{L} group demonstrated a neutral relational responding history with respect to the cooperation stimuli, with a range between -0.04 and -0.27, and an average of -0.15. For the independent stimuli, the MTL^{L} group has a neutral relational responding history, with a range between 0.08 and 0.51, and an average of 0.29.

Effect of Verbal Stimuli on Maintaining Cooperative Responding

The effects of the verbal stimuli on cooperative responding (choosing to fix partner errors, FPE) were determined through a visual depiction at the individual and group level. Motivative augmentals are defined as rules that influence behavior "due to relational networks that temporarily alter the degree to which previously established consequences function as reinforcers or punishers" (Hayes, et al., 2001, p. 109). The statements in condition D can be argued to have functioned as motivative augmentals for most participants, as the data shows participants reliably increased their FPE button selection when presented with a motivational statement regardless of which group they were assigned (see Figure 5). Those that were exposed to the high frequency presentations of the statements selected the FPE button more frequently across all four D conditions. Those that were exposed to the low frequency presentations of the statements demonstrated more of the motivative augmental effect for the first D condition and then had more variability in their FPE button selection for the remaining D conditions (see Figure 5). Results of a one-way ANOVA with repeated measures indicated that there was a statistically significant difference in choosing to fix partner errors between conditions with a motivational statement and conditions with a neutral statement $F(7, 266) = 7.21e\text{-}13$, $p = <.00001$, $n^2 = .2287$.

Exemplary Participants Across Groups

Participant 4007. Based on a visual inspection of Participant 4007's IRAP scores, they demonstrated a neutral relational responding history with cooperative verbal stimuli and a positive relational responding history with independent verbal stimuli (see Figure 7). That is, their IRAP scores for the cooperative stimuli ranged from -0.67 to 0.28 with an average score of

-0.23 at the list level. Their IRAP scores for the independent stimuli ranged from 0.25 to 1.94 with an average score of 0.85 at the list level.

For the data entry task, Participant 4007's responding appeared to come under the influence of the piece-rate and pay-for-time contingencies in the absence of verbal statements (ABA) given that during condition A (piece-rate), they consistently chose the WA button and during condition B (pay-for-time), they consistently chose the FPE button. The cooperation statements presented in the D conditions functioned as motivative augmentals, based on the reliable increases in the FPE button selection frequency for each D condition and the absence of FPE button selection in all C conditions. Participant 4007 was in the Least-to-Most (Low Frequency Statement Presentation) condition. The motivative augmental effect was most significant during the first and second presentation of the cooperative statements (D4, D3).

Participant 4020. Participant 4020 demonstrated a positive relational responding history with respect to cooperative verbal stimuli and a positive relational responding history with respect to independent verbal stimuli (see Figure 8). Their IRAP scores for cooperative verbal stimuli ranged from 0.57 to 1.75 with an average score of 1.18 at the list level. IRAP scores for independent verbal stimuli ranged from -0.87 to 1.05 with an average score of 0.06 at the list level.

For the data entry task, Participant 4020's responding came under the influence of the piece-rate financial contingency during the ABA conditions, as demonstrated by their preference in selecting the WA button throughout the ABA conditions. A motivative augmental effect is observed during the first, third, and fourth presentation of cooperation statements (D4, D2, D1), with the most significant increase in cooperative responding occurring during the first

presentation of the cooperation statement (D4) (see Figure 8). Participant 4020 was in the Least-to-Most (High Frequency Statement Presentation) group.

Participant 5002. This participant's IRAP scores revealed a neutral relational responding history with respect to cooperation verbal stimuli and a positive relational responding history with respect to independent verbal stimuli. Their IRAP scores for cooperation verbal stimuli ranged from -1.32 to 0.22 with an average score of -0.45 at the list level. IRAP scores for independent verbal stimuli ranged from 0.89 to 1.82 with an average score of 1.25 at the list level.

For the data entry task, their responding did appear to come under the influence of the piece-rate financial contingency, based on the steady increase in WA button selection during the ABA conditions (see Figure 9). The motivative augmental effect was observed during all four presentations of the cooperation statements (D1, D2, D3, D4). This participant was in the Most-to-Least (Low Frequency Statement Presentation) group. However, the rate of their FPE button selection increased over time during the D conditions.

Participant 5018. This participant's IRAP scores indicated a neutral relational responding history with respect to the cooperation verbal stimuli list, with a range of -0.61 to 0.60, and an average of -0.14. IRAP scores for the independent stimuli list also indicated a neutral relational responding history, with a range of -1.05 to 1.46, and an average of 0.31 (see Figure 10).

During phase 2, the participants button selection responding did appear to come under the influence of the piece-rate financial contingency in condition A (see Figure 10). This was evident by the increase in FPE button selection during condition B, followed by a sharp increase in FPE button selection during the second exposure to condition A. However, when verbal statements were introduced to the task ($CD^1CD^2D^3CD^4$), their button selection responding appeared to come

under the influence of the verbal statements presented on the screen. When presented with neutral statements (i.e., "Staying on task is highly valued."), the participant consistently chose the WA button. When presented with the cooperation statements, (e.g., "Cooperation is highly valued."), they consistently chose the FPE button, which demonstrated the motivative augmental effect. In other words, the derived reinforcement function for selecting the FPE button during the D conditions, was momentarily increased. Participant 5018 was in the Most-to-Least (High Frequency Statement Presentation) group.

Eye Tracking Analysis

Tobii® eye tracking software was used for 25% of participants (N=10), as a secondary measure, to determine if participants visually attended to the motivational statements, neutral statements, FPE button, and WA button during the simulated data entry task in phase 2. Those areas of the computer screen were defined as the "areas of interest" for data analysis purposes (AOI; See Appendix K). The two behavioral dimensions that were captured by the Tobbii eye-gazing measurement software were the participants' fixation count and fixation duration. Fixation count was defined as the "number of times the participant fixated on an AOI or an AOI Group (count)" (Tobii, 2016, p.108). Fixation duration was defined as the "duration of each individual fixation within an AOI, or within all AOIs to an AOI Group (seconds) (Tobii, 2016, p. 106). Participants were five randomly selected participants from the LTM^{L} group and 5 randomly selected participants from the MTL^{L} group.

Figure 11 depicts those 10 participants' frequency of button selection, as compared to, the number of times they looked at each AOI during phase 2. During phase 2, participants chose to fix partner errors 305 times and chose to work alone 1689 times, which is relatively proportional to the amount of times participants looked at the FPE button (i.e., 5,352 fixations)

and looked at the WA button (i.e., 13,822 fixations). However, there was a relatively equal distribution of fixations to the neutral statements (i.e., 1,519 fixations) and fixations to the motivational statements (i.e., 1,490 fixations).

Figure 12 depicts similar patterns when comparing the 10 participants' frequency of button selection to fixation duration. As mentioned, participants chose to fix partner errors 305 times and chose to work alone 1689 times. This was relatively proportional to the amount of time participants looked at the FPE button (i.e., 88.7 seconds) and the amount of time participants looked at the WA button (i.e., 228.44 seconds). Participants looked slightly longer at the neutral statements (i.e., 44.68 seconds) than the motivational statements (i.e., 23.96 seconds).

Post-Experiment Questionnaire

Majority of participants (n=36) said that they primarily worked alone rather than fix partner errors (see Figure 13). When asked how motivated participants were by the money they were earning during the data entry task, 40% (n=16) said they were somewhat motivated, 25% (n=10) said they were a little motivated, 20% (n=8) said not at all, and 15% (n=6) said they were very much motivated by the monetary incentive (see Figure 14). Future researchers may consider increasing the amount of money earned for correct trials, to increase the competing nature of the financial contingency. When asked how not getting paid to fix partner errors affected participants' behavior, 75% (n=30) said it decreased their level of cooperation and 25% (n=10) said it did not affect their level of cooperation (see Figure 15). When asked about the effect that the statements had on their responding 50% (n=20) of participants reported that the statements did not affect their level of cooperation, 42% (n=17) reported that the statements increased their level of cooperation, and 8% (n=3) said the statements decreased their level of cooperation (see Figure 16).

Discussion

The current study extended the research exploring the relationship between implicit responding (as measured by the Implicit Relational Assessment Procedure; IRAP) and explicit responding (as measured by a simulated data entry task) (Rafacz, Houmanfar, Smith, & Levin, 2019; Candido, 2013; Ghezzi, 2018). Although the motivative augmental effect was consistently demonstrated across all four groups, there does not appear to be any correlation between the motivative augmental effect and the sequence of IRAP stimuli from lowest valence to highest valence or vice versa (i.e., LTM versus MTL). However, those that were exposed to high frequency presentations of the cooperation verbal statements, regardless of being in the MTL or LTM groups, continued to choose the FPE button during all four D conditions, when compared to those that were exposed to low frequency presentations of the cooperation verbal statements (see Figure 5).

The differential responding between the high frequency groups (MTL^H and LTM^H) and the low frequency groups (MTL^L and LTM^L) was consistent with the definition of a motivative augmental. Similar to nonverbal motivating operations, a motivative augmental is a stimulus that *temporarily* increases the reinforcement function of particular responding (Hayes, 2004; Marracini, Houmanfar, and Szarko, 2016). The effect is inherently temporary, since the conditions under which a stimulus is likely to function as a reinforcer is dependent on not only an organism's history of reinforcement with said stimulus, but also dependent upon other current environmental factors (including states of deprivation, satiation, source of rules, frequency of explicit rule presentation, etc.). Given that participants were placed under a competing financial contingency, the augmenting function that occurred during the initial presentation of the verbal statements at the beginning of each 3-minute condition likely diminished, as participants

continued to contact the direct financial consequences for their cooperative responding. In other words, they learned that when they choose the FPE button, they did not earn money, but when they chose the WA button, they earned money. However, for those exposed to the high frequency presentations of the cooperation statements, their cooperative responding maintained, suggesting that the frequency of explicit rule presentation maintains the motivative augmental effect. These findings may have utility for leadership and management in organizational settings when considering the frequency at which motivational content is presented to employees to maintain cooperation, especially when there are no monetary incentives available for increasing cooperative responding.

Limitations and Future Research

The research examining the effects of motivative augmentals is extremely limited (Kissi, et al., 2017). One limitation of the current experiment was that it did not systematically control for participants' history with respect to the verbal stimuli across groups. It's possible that some participants were more likely to cooperate under the competing financial contingencies due to a stronger history of reinforcement for cooperative responding than others. However, given that there was no inclusion criterion based on IRAP scores to move on to phase 2 and since participants were randomly assigned to 1 of 4 groups, this variable was not controlled for. Future research should include an inclusion criterion based on participant IRAP scores (phase 1) to proceed to phase 2, similar to the methodology used in Ghezzi (2018). This alteration in methodology would allow researchers to know with more precision the degree to which the IRAP has predictive validity for identifying stimuli that function as motivative augmentals.

Future research could also combine procedural techniques used in Ju & Hayes (2008) with the current line of research. Specifically, to control even further for the impact that each

participants' history has in relation to verbal stimuli, one could first train arbitrary stimuli to function as augmentals via a match-to-sampling procedure (i.e., establish arbitrary stimuli to function as formative augmentals). Then, one could embed those arbitrary stimuli into the IRAP to assess for a participants' BIRRs to said stimuli. Then, one could examine the motivative augmental effect of those arbitrary stimuli on cooperative responding under a competing financial contingency. This alteration in procedure would allow researchers a way to understand 1) the processes by which augmentals are formed, 2) the effects of motivative augmentals on cooperative responding, and 3) the ability to capture shared stimulus function (via the IRAP), for different members of a group, in a way that controls more thoroughly for each individual participants' history with verbal stimuli by using arbitrary stimuli as the target stimuli of the task.

Conclusion

As the world evolves toward a more globalized, interconnected community and natural common pool resources diminish at an exponential rate, the need to cooperate with one another to achieve shared goals is more critical than ever. In capitalist societies, it is common for individuals or groups to be placed under competing financial contingencies, given that competition is an inherent aspect of the capitalist selection process (Biglan, Lee, & Cody, 2016). For many organizations, the primary goal is to obtain and increase financial resources, which at times may conflict with organizational prosocial values (Houmanfar, Alavosius, Morford, Herbst, & Reimer, 2015). Although rules play a critical role for successfully sustaining coordination among groups, the research investigating the role of rules on behavior is extremely limited (Kissi, et al., 2017).

The current study was an extension of Rafacz, Houmanfar, Smith, & Levin (2019), Candido (2013), and Ghezzi (2018) by examining the effects of verbal stimuli (i.e., rules) on

cooperative choice behavior during a competing financial contingency. Results demonstrated the temporary effects of motivative augmentals on choice behavior during a competing contingency. Future research should continue to examine the effects of motivative augmentals, as well as, the relationship between BIRRs (captured by the IRAP) and EERRs.

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Tables

Table 1. Pilot study practice phase of medical data entry task

Condition	A	B	A	B
Duration	90 sec	90 sec	90 sec	90 sec
Verbal Statement	None	None	None	None
Financial Contingency	Profit-Share	Piece-Rate	Profit-Share	Piece-Rate

Table 2. Pilot study experimental phase of medical data entry task

Condition	A	B	A	C	D	C	D
Duration	3 min	3 min	3 min	3 min	3 min	3 min	3 min
Verbal Statement	None	None	None	Neutral Statement (NS) #1	Motivational Statement (MS) #1	NS #2	MS #2
Financial Contingency	Piece-Rate (PR)	Profit-Share (PS)	PR	PR	PR	PR	PR

Table 3. IRAP target stimuli

Cooperation Stimuli List	Independent Stimuli List
Collaboration	Independence
Cooperation	Flying Solo
Team Player	Self-Sufficient
Group Effort	On My Own

Table 4. Raw IRAP scores for both classes of stimuli

	Cooperation Stimuli				Independent Stimuli			
P	Collaboration	Cooperation	Group Effort	Team Player	Independence	Flying Solo	On My Own	Self-Sufficient
4001	1.521	1.176	0.715	1.501	-1.222	-1.245	-1.864	-0.808
4002	0.744	1.222	-0.256	-1.398	0.201	-0.075	1.203	0.050
4003	-0.050	-0.709	-0.226	0.164	0.154	1.124	2.995	0.960
4005	-0.409	-0.505	-0.290	1.307	0.009	-0.272	-1.546	0.898
4006	0.370	0.551	-0.353	-1.049	-0.171	2.315	0.396	-0.756
4007	-0.151	-0.670	-0.388	0.277	0.512	0.688	0.252	1.940
4008	-1.211	-0.610	0.666	-1.301	1.577	1.264	1.443	0.681
4009	0.037	-0.461	0.886	2.596	-0.247	3.361	-0.182	-0.109
4010	0.375	0.372	-0.225	0.953	0.149	0.880	-0.363	0.049
4011	0.856	0.339	-1.034	-0.014	1.090	0.111	0.723	2.161
4016	2.262	0.363	-0.067	0.406	0.154	1.743	-0.651	0.533
4017	0.098	0.226	-0.924	0.635	0.415	-0.124	0.748	-0.484
4018	0.699	0.484	-0.138	1.771	0.521	0.076	0.795	0.836
4019	-0.089	-1.009	-0.127	-0.666	0.056	0.503	0.486	-0.502
4020	1.746	1.615	0.180	0.573	-0.876	1.056	-0.014	0.285
4021	0.013	-1.614	0.592	-0.102	-0.091	0.380	-0.072	0.595
4022	-0.416	-0.950	-0.312	0.314	-0.639	0.226	-0.275	-0.031
4023	0.765	-0.195	0.563	-0.301	-0.852	1.091	0.002	-0.476
4024	0.477	-0.237	0.131	0.467	-1.964	0.220	0.536	0.625
4025	0.598	1.712	1.406	0.583	0.541	1.836	-0.569	-0.247
5002	-0.817	-1.321	0.124	0.221	1.163	1.825	1.112	0.898
5003	0.359	2.073	-0.300	-3.106	-0.271	-0.229	0.619	-0.650
5004	0.886	-0.007	1.616	-0.052	-0.489	-0.173	0.701	-0.729
5005	0.541	0.805	-1.101	0.263	-0.201	-0.395	0.164	0.729
5006	-0.461	-1.314	0.039	0.128	0.008	0.776	-0.062	0.767
5007	-0.260	-1.698	-0.204	0.367	0.803	1.278	0.172	-0.271
5008	-0.686	-0.886	-0.110	-0.553	2.015	0.594	1.126	0.009
5009	0.074	-0.003	-0.114	0.159	0.851	0.649	-0.147	-0.675
5014	-0.825	-0.748	-0.776	0.171	0.943	-0.930	-0.798	0.362
5015	-0.378	0.444	0.464	1.058	0.231	-0.395	-0.055	0.381
5016	0.129	-0.906	0.999	0.322	0.244	0.130	0.391	0.406
5017	-0.730	-0.592	1.771	0.637	-0.116	2.628	0.648	1.240
5018	-0.547	0.599	-0.010	-0.608	-0.218	1.463	-1.055	1.052
5019	-0.898	0.312	-1.148	-0.315	0.422	-1.024	-0.450	1.045
5020	-0.088	1.238	-0.254	0.183	-0.241	0.630	0.831	-0.046
5021	-0.326	-0.341	-1.340	-0.704	-0.259	0.248	0.443	-0.002
5022	1.113	0.467	-0.458	-0.201	0.530	-2.315	0.083	-0.971
5023	-1.323	0.279	0.261	-1.013	0.085	0.805	0.346	2.752
5024	0.382	0.623	-0.412	-0.029	0.558	0.594	1.228	-0.254
5025	0.590	-0.342	-0.167	-0.809	-0.339	-0.312	0.497	0.298
P 1	0.513	0.716	0.579	0.412	0.882	1.442	1.605	0.465
P 2	2.204	-2.785	0.792	-0.218	1.640	0.302	0.026	0.134
P 3	0.599	-0.842	0.358	0.927	0.103	0.703	1.289	1.076

Table 5. Aggregated IRAP scores for both classes of stimuli

	Cooperation Stimuli				Independent Stimuli			
Group	Collaboration	Cooperation	Group Effort	Team Player	Independence	Flying Solo	On My Own	Self-Sufficient
MTL (All)	-0.163	-0.065	-0.055	-0.194	0.285	0.292	0.289	0.317
LTM (All)	0.411	0.054	0.040	0.335	-0.034	0.757	0.202	0.310
MTL^{H}	-0.169	0.133	-0.075	-0.253	0.066	0.284	0.296	0.551
MTL^{L}	-0.156	-0.265	-0.036	-0.134	0.505	0.299	0.283	0.082
LTM^{H}	0.615	0.039	0.130	0.367	-0.273	0.700	0.098	0.113
LTM^{L}	0.208	0.070	-0.050	0.303	0.205	0.815	0.305	0.506

Table 6. Experimental study practice phase of EKG medical data entry task

Condition	Practice
Duration	60 sec
Verbal Statement	None
Financial Contingency	None

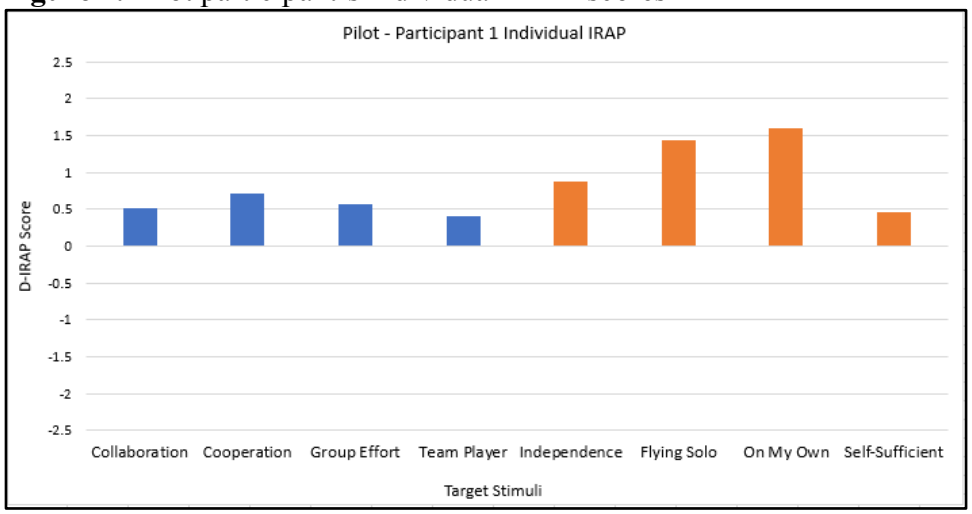
Table 7. Experimental study Least-to-Most and Most-to-Least group conditions for EKG medical data entry task

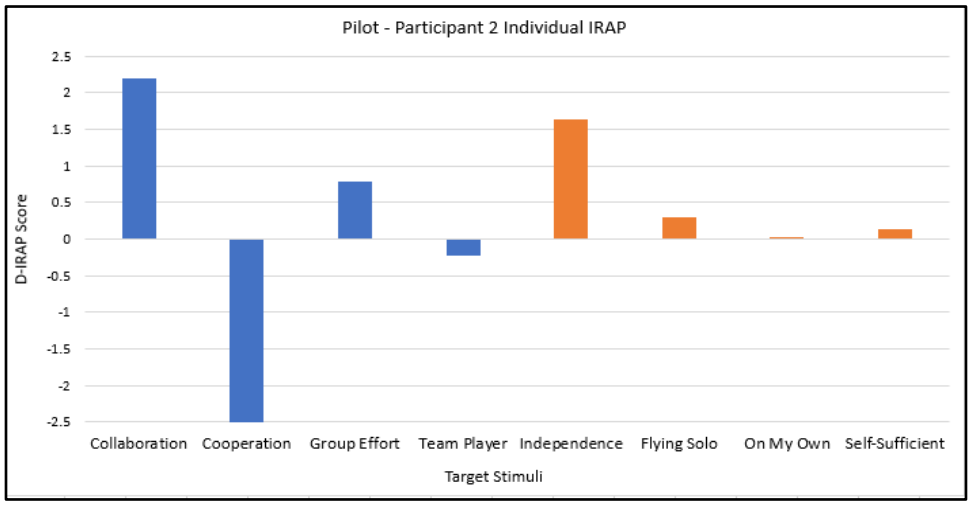
Least-to-Most - High Frequency (LTM^H)											
Condition	A	B	A	C	D4	C	D3	C	D2	C	D1
Duration	3 min	3 min	3 min	3 min	3 min	3 min	3 min	3 min	3 min	3 min	3 min
Verbal Statement	None	None	None	Neutral Statement (NS)	Motivational Statement (MS)	NS	MS	NS	MS	NS	MS
Frequency of Statement	None	None	None	Every Trial	Every Trial	Every Trial	Every Trial	Every Trial	Every Trial	Every Trial	Every Trial
Financial Contingency	Piece-Rate (PR)	Pay-for-Time (PFT)	PR	PR	PR	PR	PR	PR	PR	PR	PR
Least-to-Most - Low Frequency (LTM^L)											
Condition	A	B	A	C	D4	C	D3	C	D2	C	D1
Duration	3 min	3 min	3 min	3 min	3 min	3 min	3 min	3 min	3 min	3 min	3 min
Verbal Statement	None	None	None	NS	MS	NS	MS	NS	MS	NS	MS
Frequency of Statement	None	None	None	None	1st Trial	1st Trial	1st Trial	1st Trial	1st Trial	1st Trial	1st Trial
Financial Contingency	PR	PFT	PR	PR	PR	PR	PR	PR	PR	PR	PR
Most-to-Least – High Frequency (MTL^H)											
Condition	A	B	A	C	D1	C	D2	C	D3	C	D4
Duration	3 min	3 min	3 min	3 min	3 min	3 min	3 min	3 min	3 min	3 min	3 min
Verbal Statement	None	None	None	NS	MS	NS	MS	NS	MS	NS	MS
Frequency of Statement	None	None	None	Every Trial	Every Trial	Every Trial	Every Trial	Every Trial	Every Trial	Every Trial	Every Trial
Financial Contingency	PR	PFT	PR	PR	PR	PR	PR	PR	PR	PR	PR
Most-to-Least – Low Frequency (MTL^L)											
Condition	A	B	A	C	D1	C	D2	C	D3	C	D4
Duration	3 min	3 min	3 min	3 min	3 min	3 min	3 min	3 min	3 min	3 min	3 min
Verbal Statement	None	None	None	NS	MS	NS	MS	NS	MS	NS	MS
Frequency of Statement	None	None	None	1st Trial	1st Trial	1st Trial	1st Trial	1st Trial	1st Trial	1st Trial	1st Trial

Figures

Figure 1-3. Pilot participant results.

Figure 1. Pilot participant's individual IRAP scores





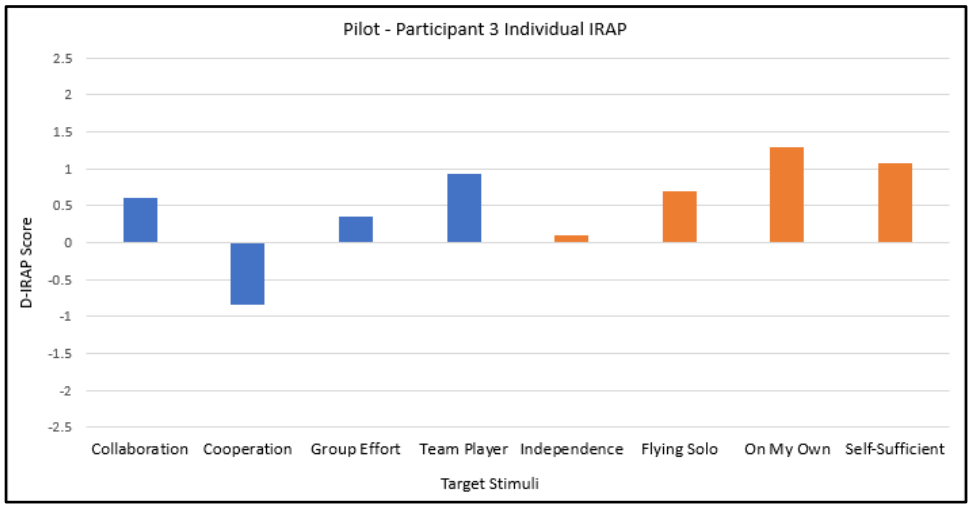


Figure 2. Pilot group aggregated IRAP scores

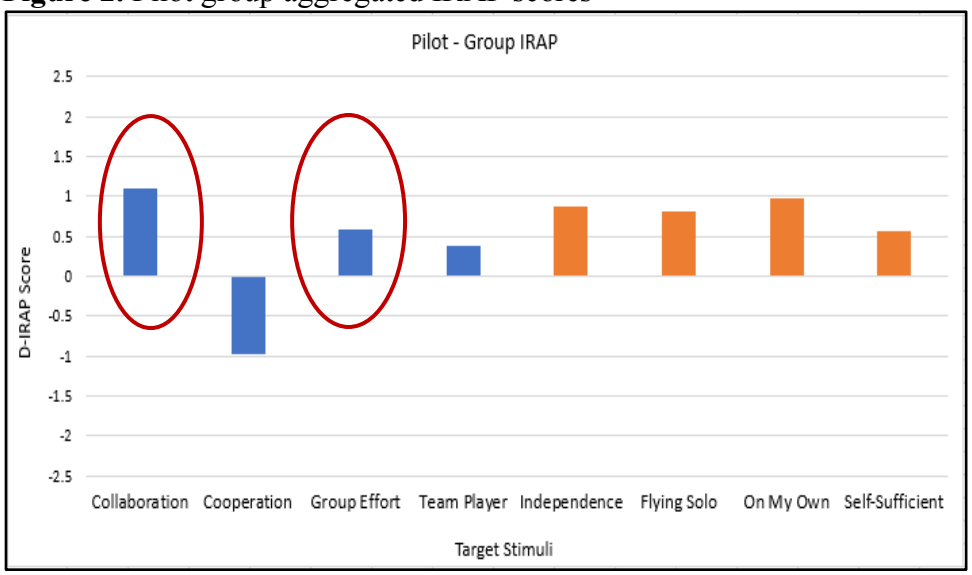
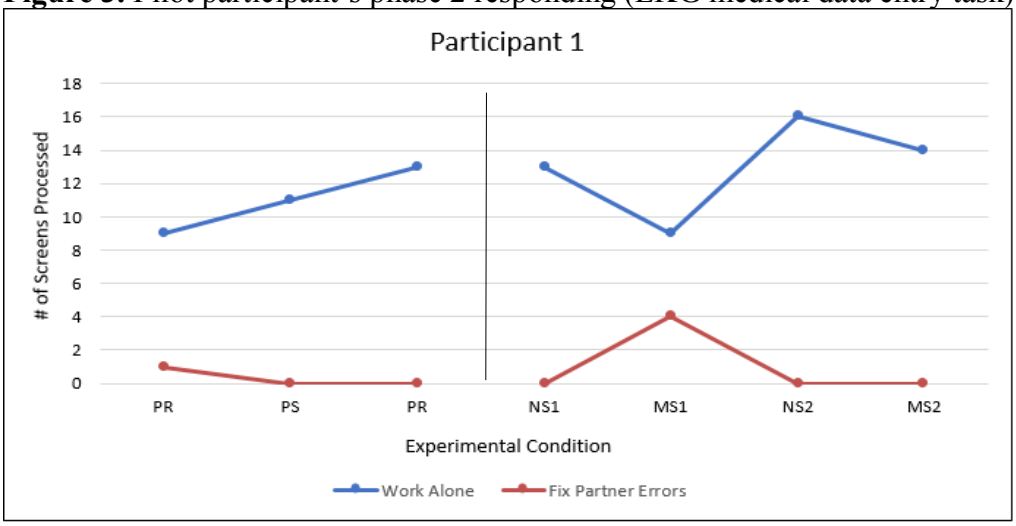
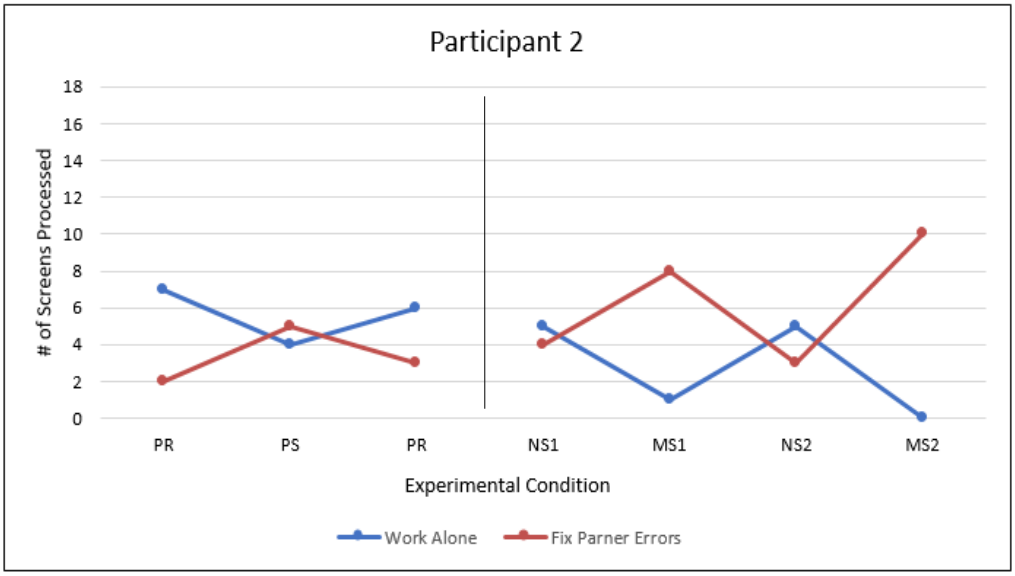


Figure 3. Pilot participant's phase 2 responding (EKG medical data entry task)





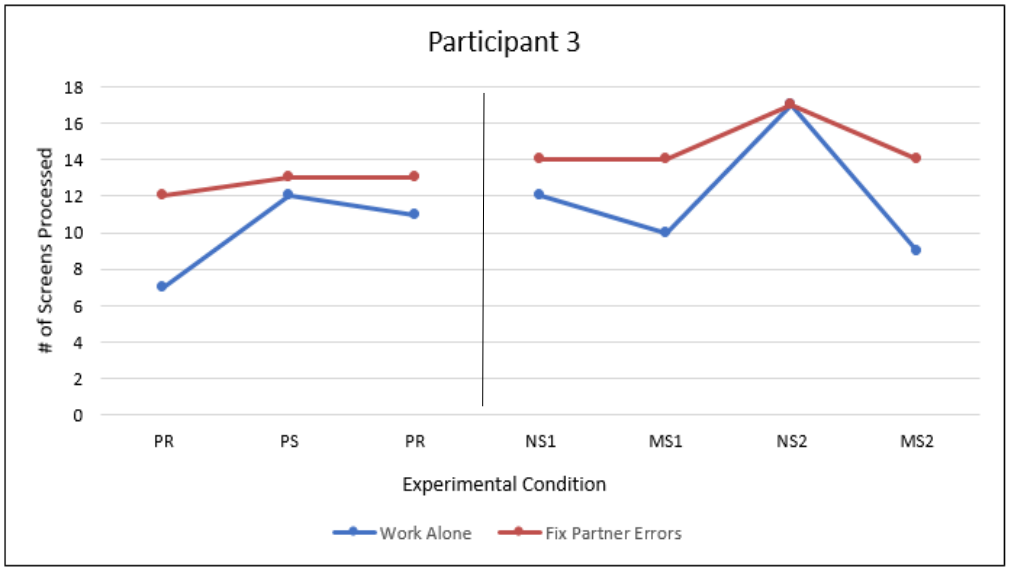
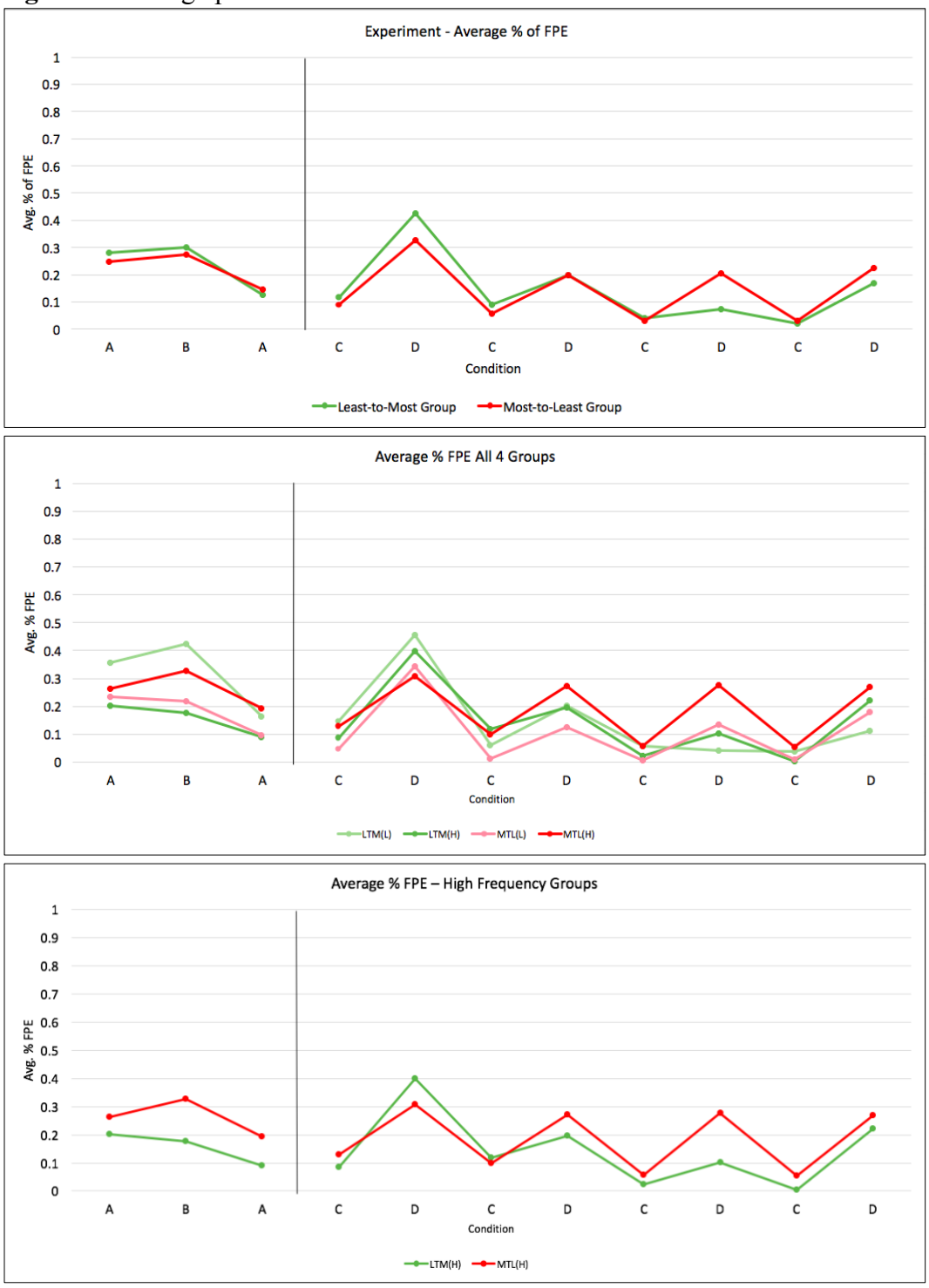

Participant 3
# of Screens Processed
18
16
14
12
10
8
6
4
2
0
PR
PS
PR
NS1
MS1
NS2
MS2
Experimental Condition
Work Alone
Fix Partner Errors

Figure 4 – 10. Experimental study results (IRAP and EKG data entry task).

Figure 4. Experimental Groups - Aggregated IRAP scores

Figure 5. Average percent of FPE button selection



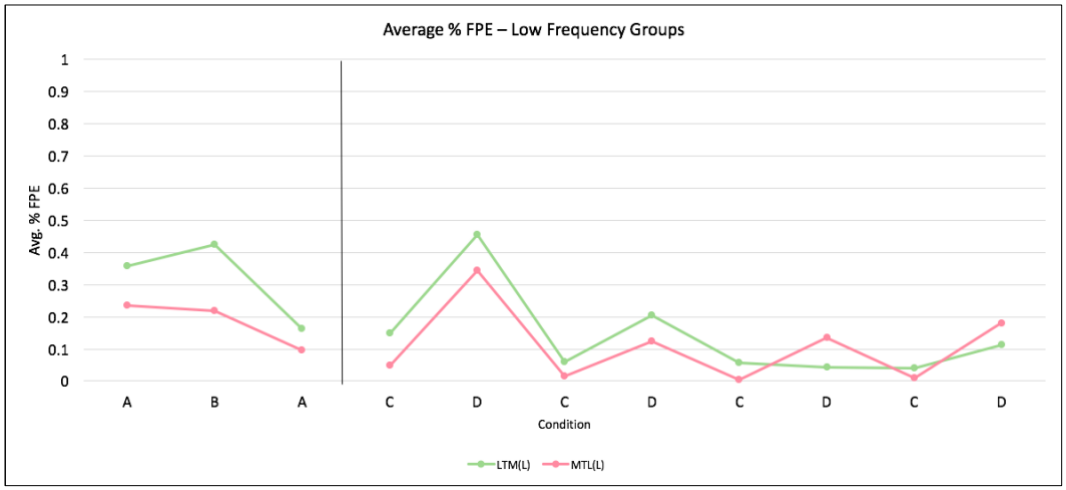

Average % FPE – Low Frequency Groups
Avg. % FPE
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
A
B
A
C
D
C
D
C
D
C
D
Condition
LTM(L)
MTL(L)

Figure 6. Percent of participants who chose to fix partner errors (FPE) within first 3 choices in each condition

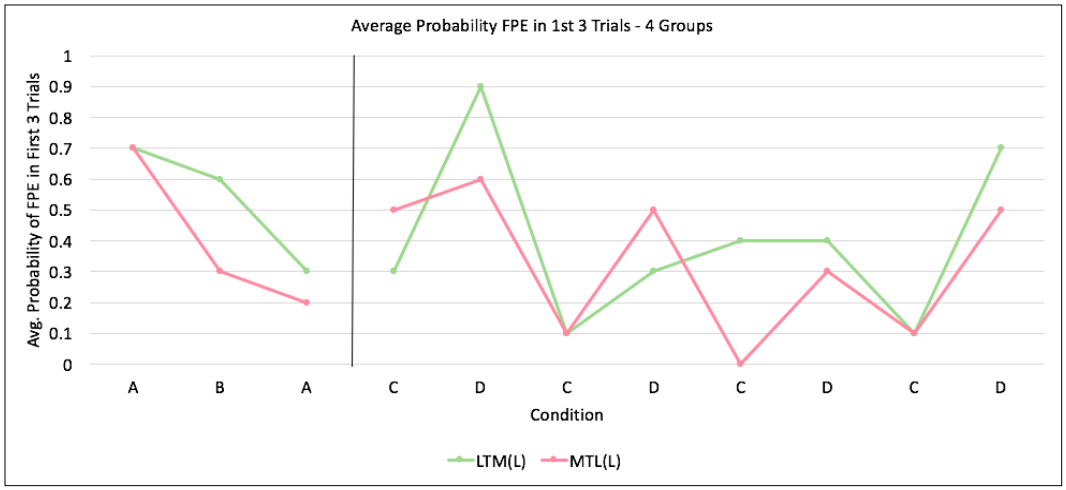

Average Probability FPE in 1st 3 Trials - 4 Groups
Avg. Probability of FPE in First 3 Trials
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
A
B
A
C
D
C
D
C
D
C
D
Condition
LTM(L)
MTL(L)

Figure 7. Individual results for LTM^{L} participant 4007

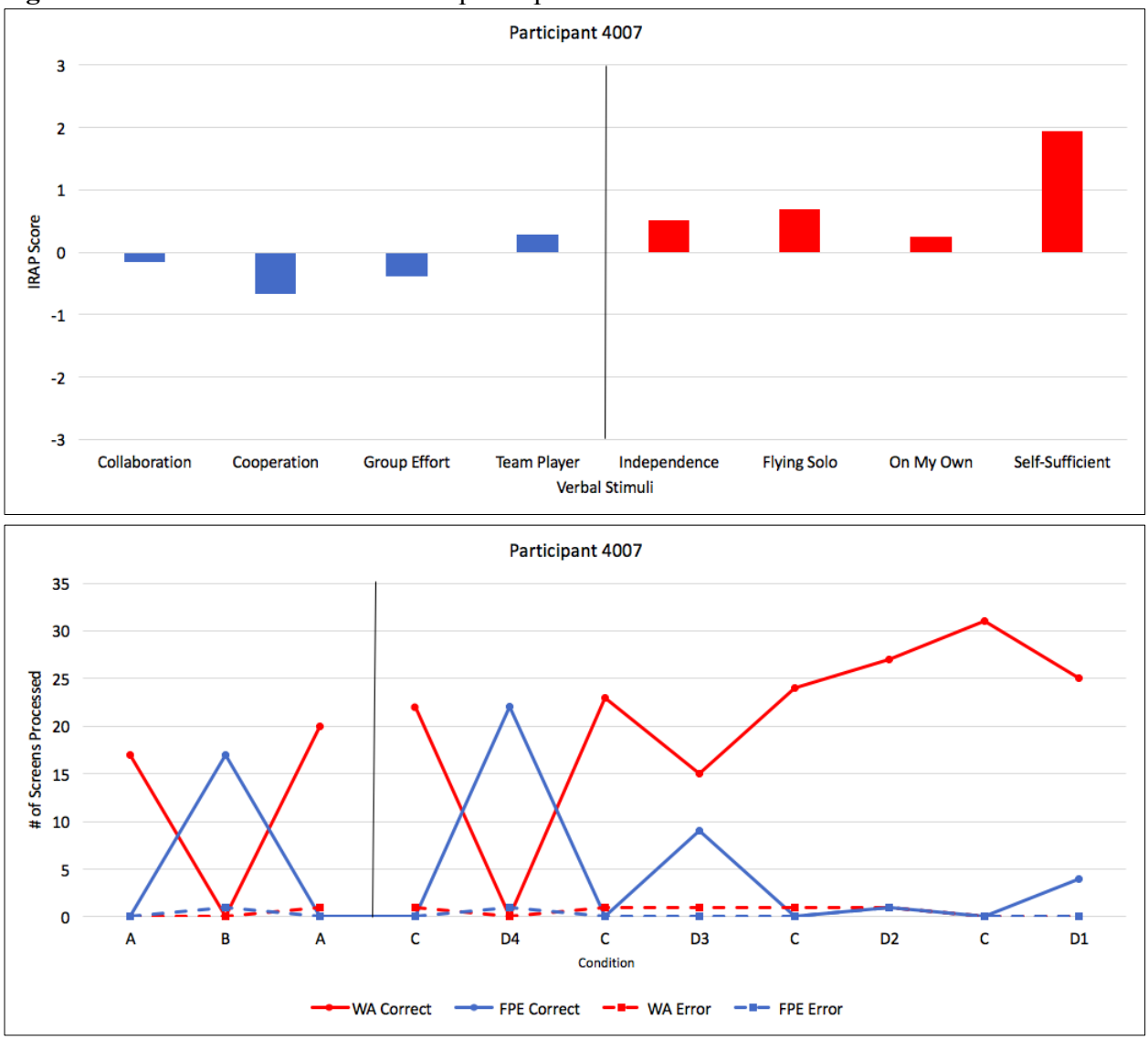


Figure 8. Individual results for LTM^{H} participant 4020

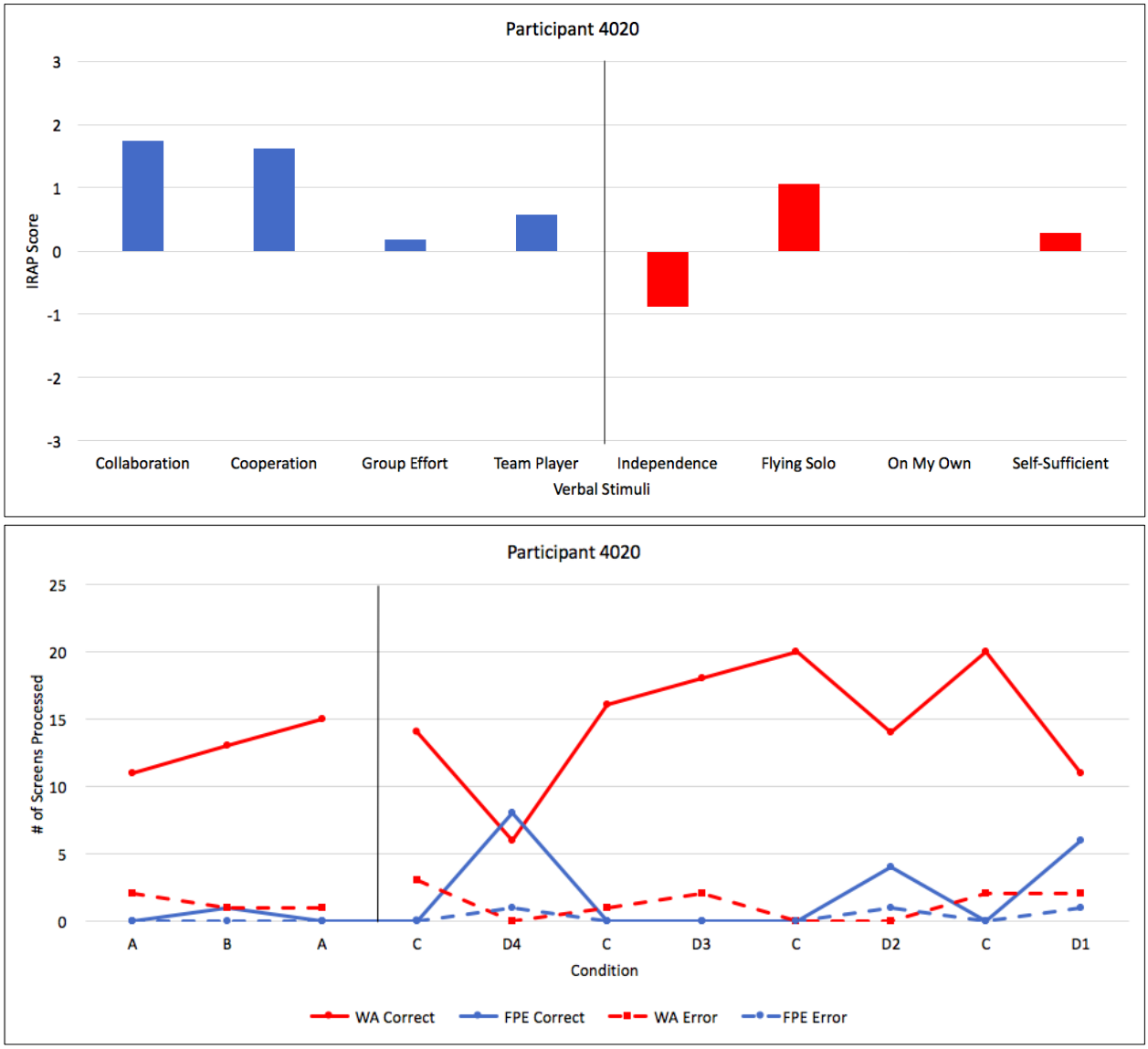
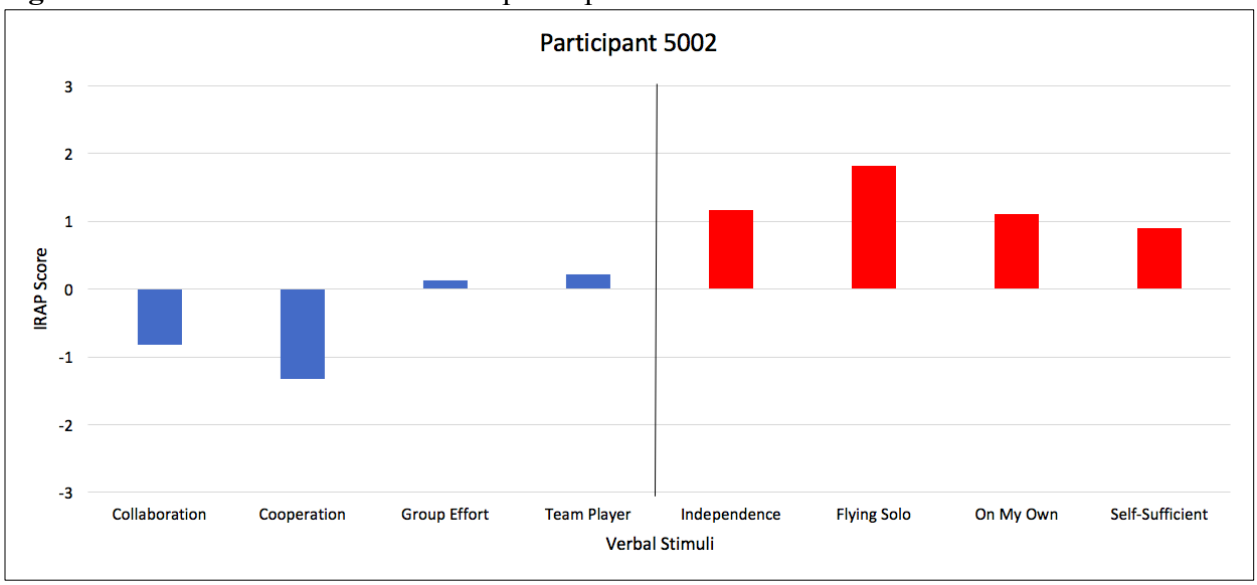


Figure 9. Individual results for MTL^{L} participant 5002



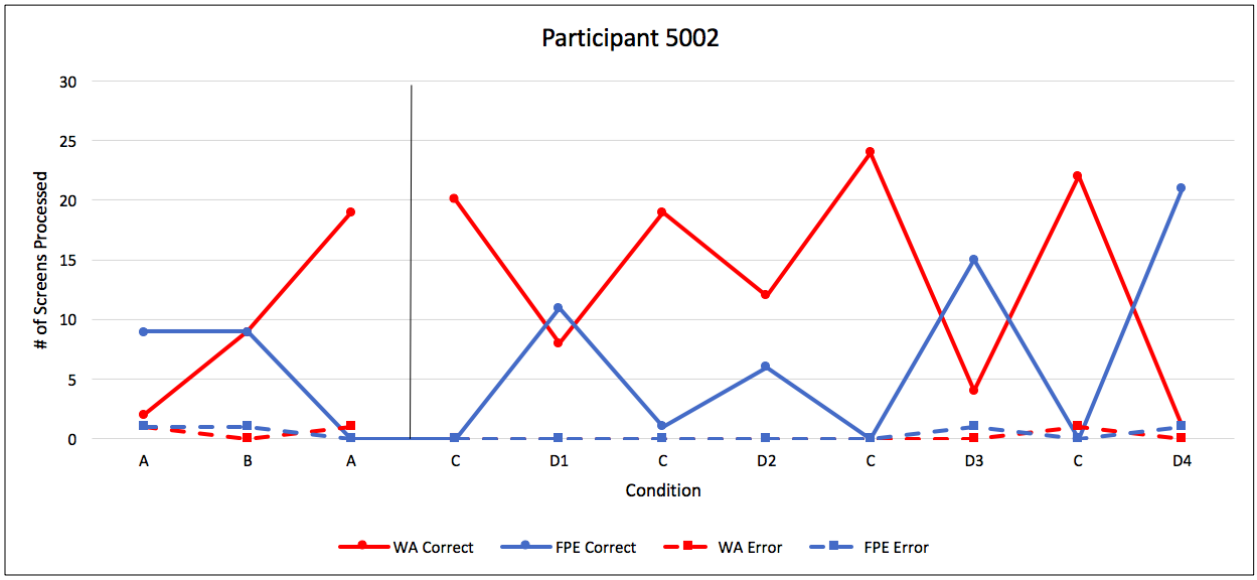
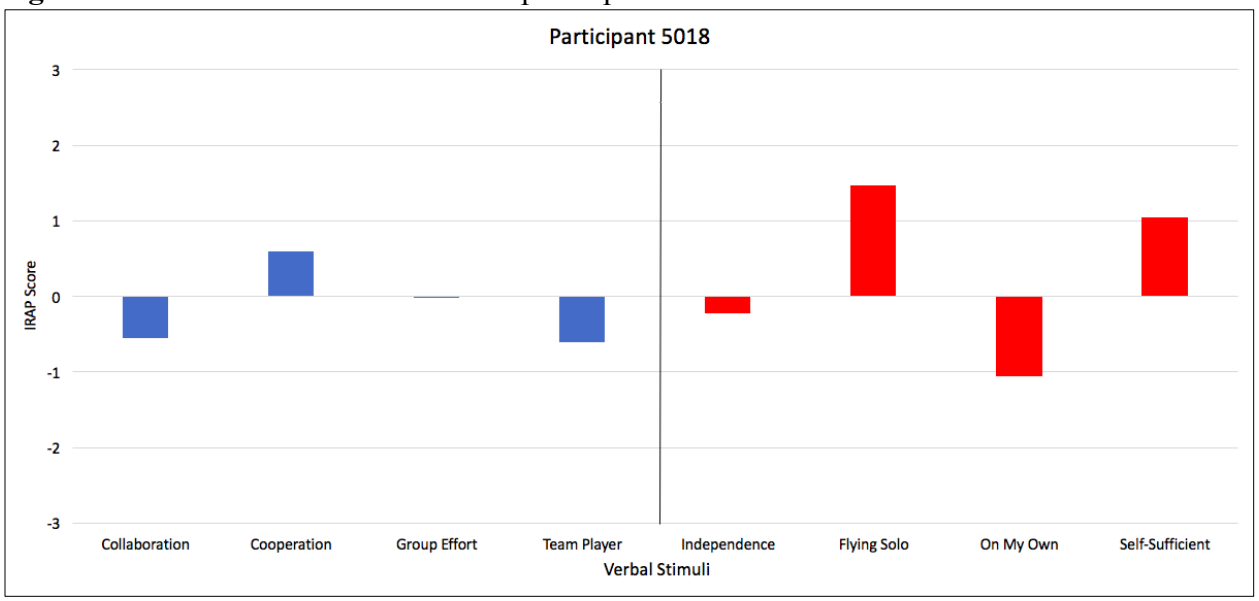


Figure 10. Individual results for MTL^{H} participant 5018



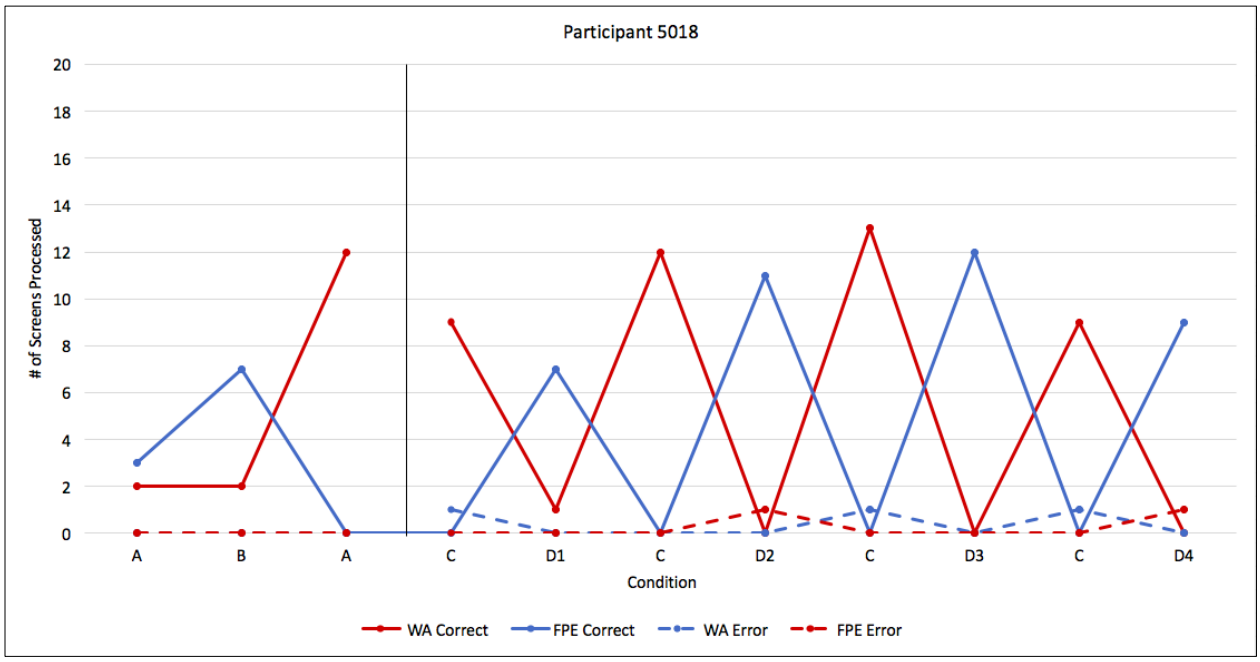


Figure 11-12. Eye-tracking results.

Figure 11. Comparison of button choice frequency and fixation count for 25% of participants.

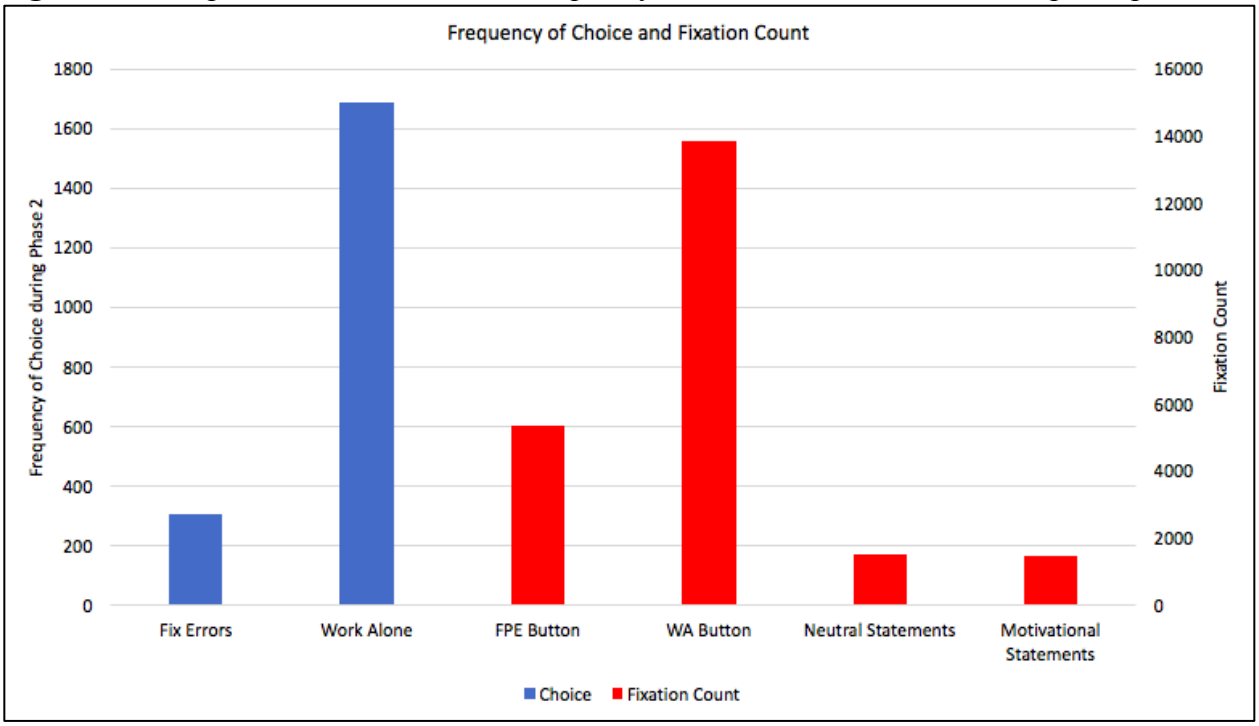


Figure 12. Comparison of button choice frequency and fixation duration for 25% of participants.

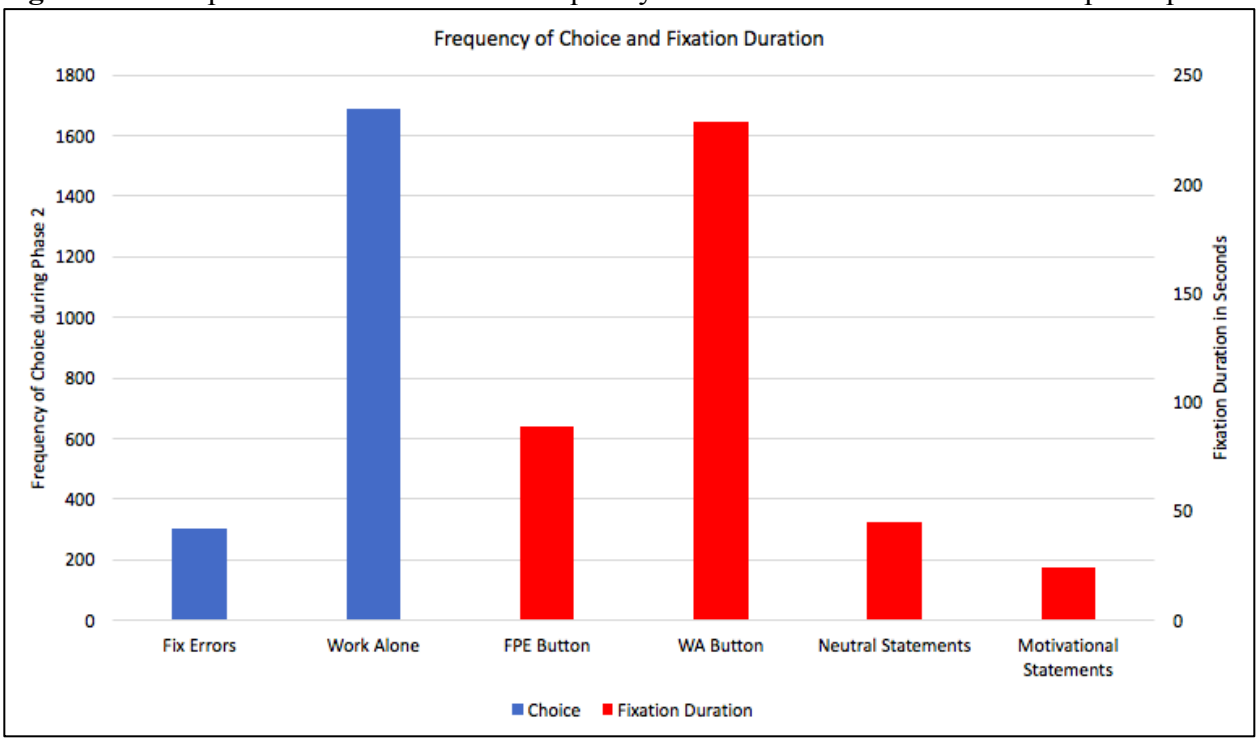


Figure 13-16. Post-experiment questionnaire results.

Figure 13. Percent of participants self-reporting working alone or fixing partner errors.

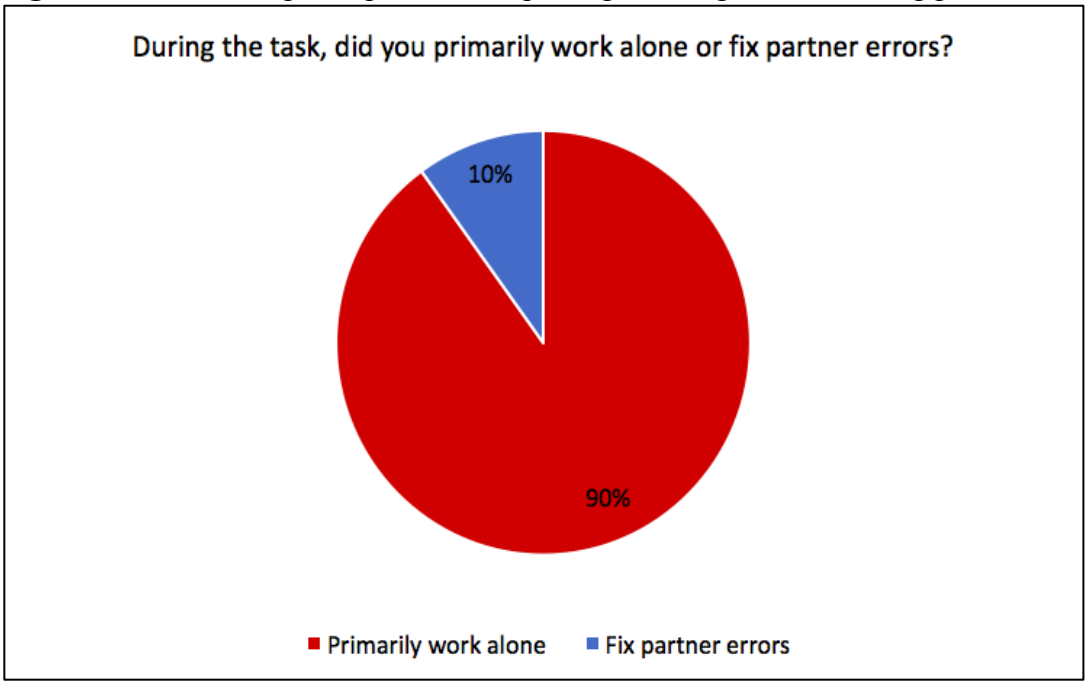


Figure 14. Percent of participants self-reported motivation for monetary incentive.

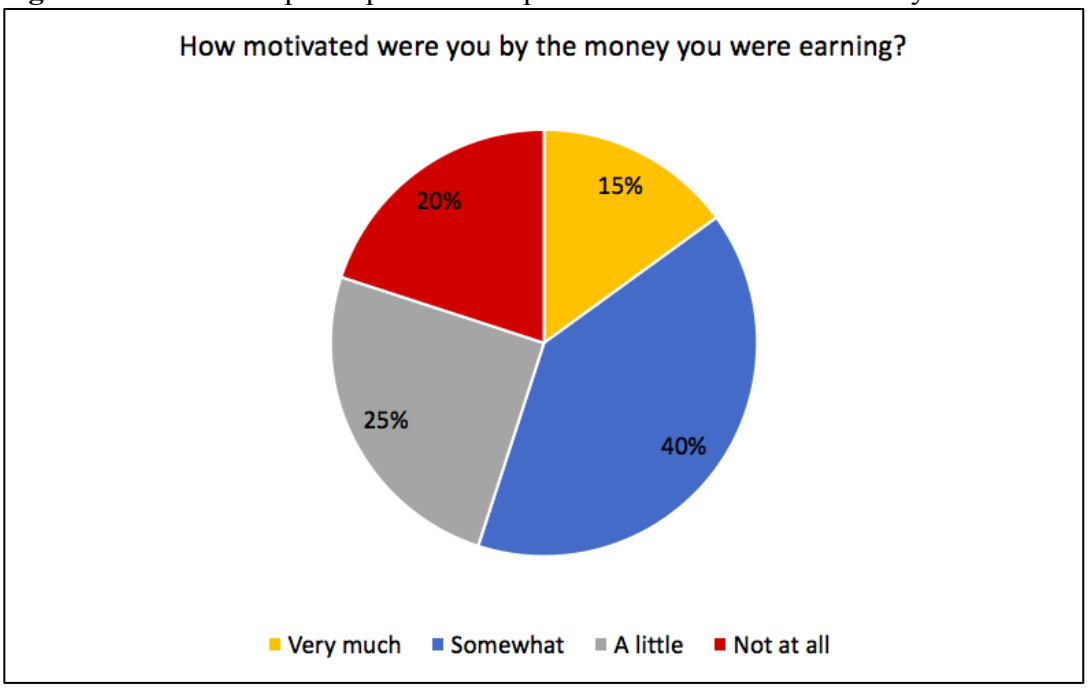


Figure 15. Percent of participants self-reporting on how not getting paid effected their level of cooperation.

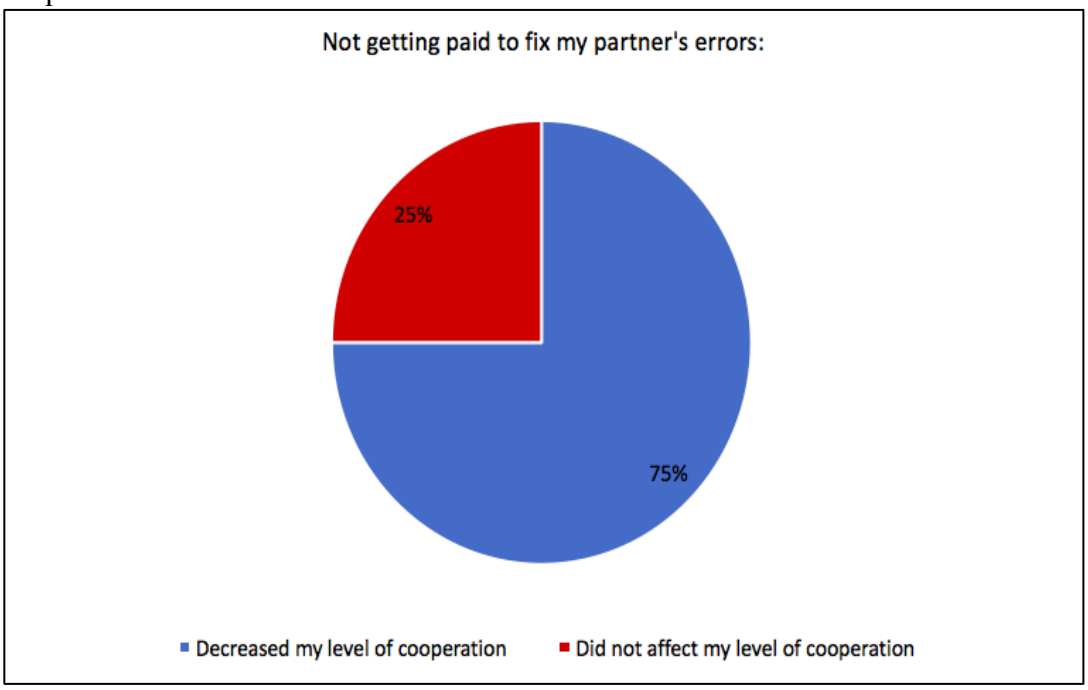
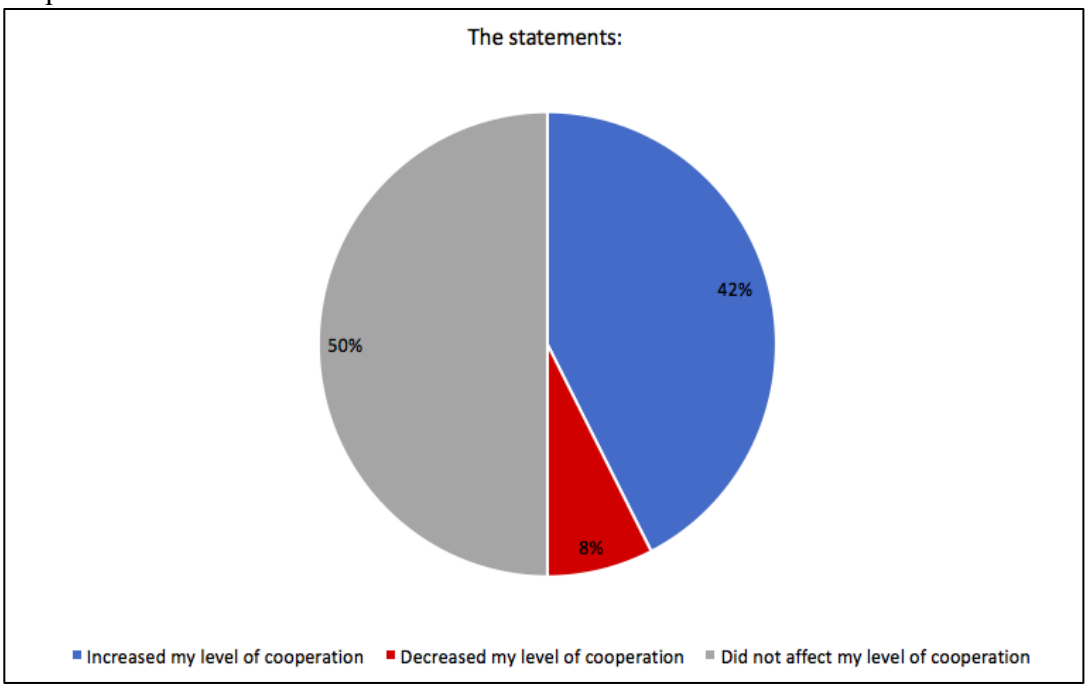


Figure 16. Percent of participants self-reporting the effect the statements had on their cooperation.



Appendices

Appendix A
IRAP stimuli survey

Please rank from the list below, the terms that best describe the statement "conforming with others". (1 = strongest, 10 = weakest).

- Compliance
- Defer
- Obey
- Go Along With
- Abide By
- Follower
- Allegiance
- Fit in
- Submit
- Accomodate

Please rank from the list below, the terms that best describe the word "working with others". (1 = strongest, 10 = weakest).

- Team Player
- Cooperation
- Group Effort
- Partnership
- Unity
- Helpfulness
- Reciprocity
- Assist
- Collaboration
- Consideration of Others

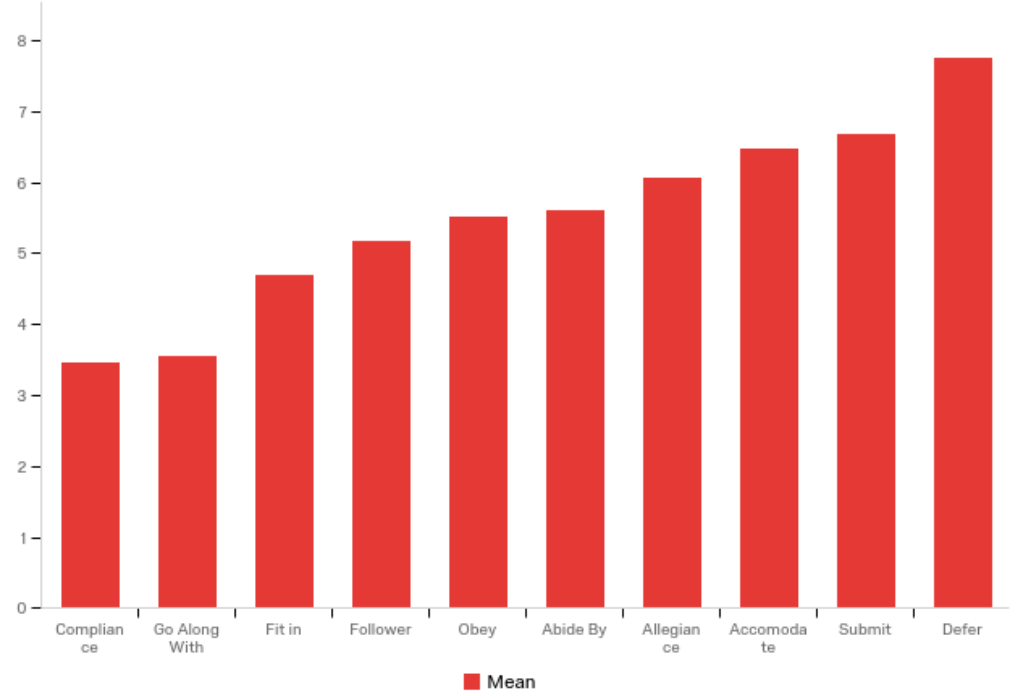
Please rank from the list below, the terms that best describe the word "working alone". (1 = strongest, 10 = weakest).

- Flying Solo
- Doing it my way
- On my own
- Survival of the fittest
- Autonomous
- Self reliance
- Self sufficient
- Untethered
- All by myself
- Independent

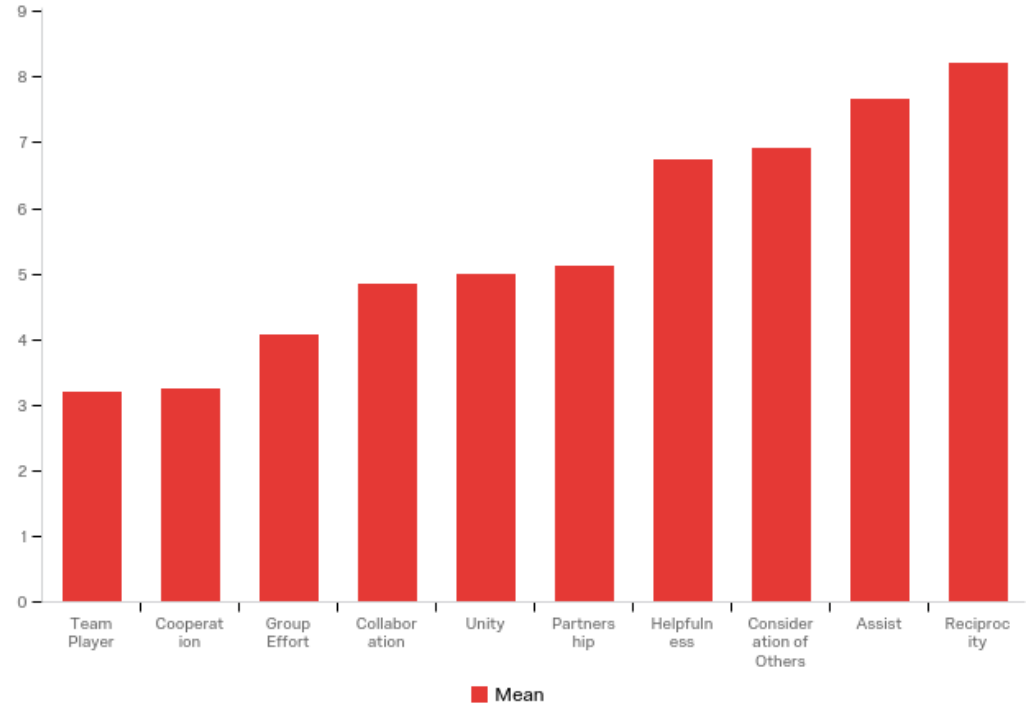
Appendix B

IRAP stimuli survey results

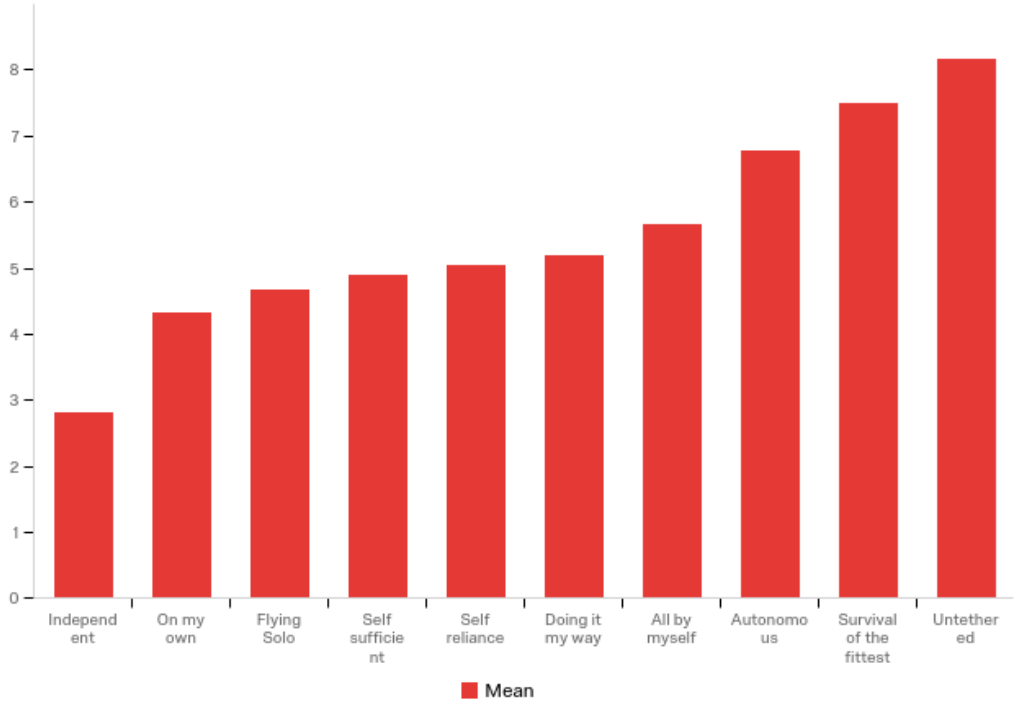
Q1 - Please rank from the list below, the terms that best describe the statement "conforming with others". (1 = strongest, 10 = weakest).



Q2 - Please rank from the list below, the terms that best describe the word "working with others". (1 = strongest, 10 = weakest).



Q3 - Please rank from the list below, the terms that best describe the word "working alone". (1 = strongest, 10 = weakest).



Appendix C

Inclusion Criteria Form

Please Indicate the following:	Yes	No	N/A
Are you under the age of 18? If not, when in your birthday? _____			
Do you experience, or have you experienced, an arthritic condition or a repetitive stress injury in your hands or neck?			
Have you previously participated in a study entitled "The Effects of Individually-Determined Stimuli on a Data Entry Task?"			
Have you previously participated in a study entitled "The Effects of Group-Determined Stimuli on a Data Entry Task?"			
Have you previously participated in a study entitled "The Effects of Varying Stimuli on a Data Entry Task?"			

**If you have answered "Yes" to any of the above listed questions then you are ineligible to participate in this study.

I attest that all the above marked information is accurate.

_____

Participant Name (Printed)

_____ _____

Participant Signature Date

Appendix D
IRAP Instructions

For Part I of this experiment, you will be presented with three words simultaneously.

These include
(1) a sample word (ex: Comfortable) at the top of the screen
(2) a target word in the center of the screen (ex: "Beetles") and
(3) an accuracy word (either "Agree" or "Disagree")

You can interpret the combinations of these words as if they were a sentence. For example, on Screen 1 (*experimenter presents IRAP Screen Shot)* "I am comfortable with Beetles. Do you Agree or Disagree?" For Screen 2 however, the statement would read "I am uncomfortable with Beetles. Do you Agree or Disagree?"

To respond to these statements you will indicate your answer by selecting "Agree" or "Disagree" (or pressing the "d" or "k" letter on the keyboard).

There will be instructions provided at the beginning of each trial block, indicating how to respond accurately. For example, "For this block, respond as if you were comfortable with insects." In the subsequent block you may receive instructions that say, "For this block, respond as if you are *uncomfortable* with insects."

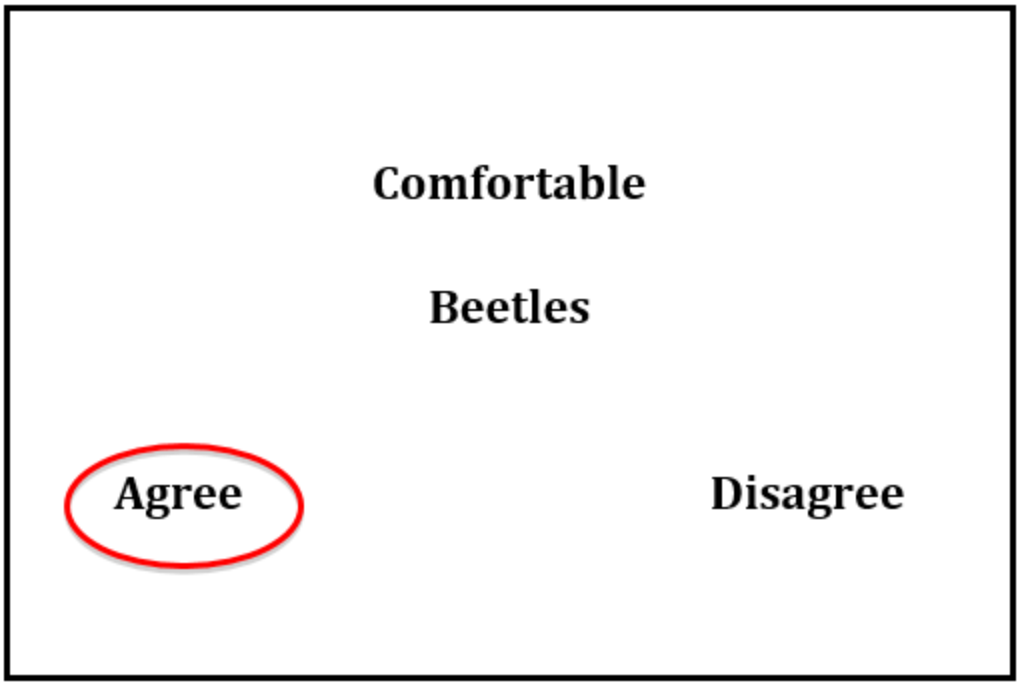
It is essential, that while completing these screens, you respond as **quickly** and **accurately** as possible. Before initiating the experimental phase of this study, you must first be able to pass two different practice phases.

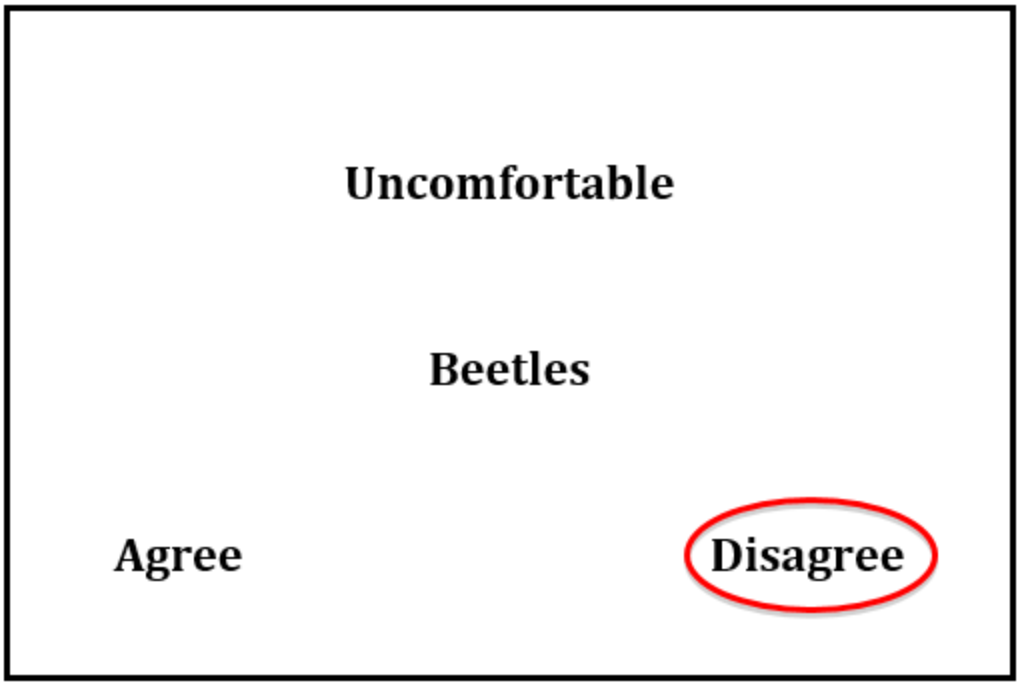
> During the first practice phase, you will only be exposed to "comfortable" accuracy words. Responding during this time should take no more than 3 seconds on average to complete, and responses must be made at an accuracy level of 75% or higher in order to proceed to the second practice phase.
>
> During the second practice phase, both "comfortable" and "uncomfortable" accuracy words will randomly be presented. Again, responding should take no more than 3 seconds on average, and must be made at an accuracy level of 75% or higher, in order to proceed to the actual experimental phase.

If you are unable to respond to these sequences of words under and/or around an average of 3 seconds, and at a level of 75% accuracy you will not be able to continue on with this experiment.

Do you have any questions?

The Implicit Relational Assessment Procedure (IRAP) Sample





Appendix E

Medial Data Entry Instructions

For this part of the study you will be working as an Electrocardiography (ECG) Technician for a medical records company named Medical, Incorporated. One of the main responsibilities of ECG Technicians is to review and compare patient heart rates and rhythms against normal ranges.

Being that accuracy of reporting for this job is extremely important, you will be working with a partner to correct each other's mistakes. In order to ensure correct screens, at any time, you can either choose to work on your own data-entry comparisons or select to fix your partner's errors.

(refer to screen shot examples)

To begin comparing and completing each patient's set of information, you will:

- Select the button that says "start work session", which will begin a 3-minute timer
- At that time, you can select to either "work alone" or "fix partner's errors"
    - No Matter what you choose, the data entry task remains pretty much the same.

On Each Data Entry Screen: You will be shown everything you need to know to report 1) The patient's QT interval (i.e., patient gender and QT interval) and 2) The Patients Heart Rate (i.e., patient age and heart rate).

To determine QT interval:
You will compare your patient's QT Interval value with the normal QT interval range for both genders as presented on the screen. You will then use the mouse and click the "below range", "within range" or "above range" option depending upon where your current patient's value lies.

To compare Heart Rate:
As in determining patient QT interval values, you will compare the patient's presented heart rate to a series of ranges based on the person's indicated age. After doing so, you will select if it is "below average", "average" or "above average" and then click "submit" to complete the screen.

*Once you submit the screen, a small red "X" will appear if you made an error in your data-entry.

At this point the two buttons with "work alone" and "fix partner's errors" will reappear. If you choose to "work alone" the next patient's information will appear for you to complete. If you choose to "fix partner's errors" the screen will appear with pre-completed fields on the right for you to correct any mistakes.

You will continue completing patient data screens until each 3-minute work session ends.
At the conclusion of each session, you will be provided with a feedback screen, which will indicate how many screens you completed correctly and how much money you have earned for doing so.

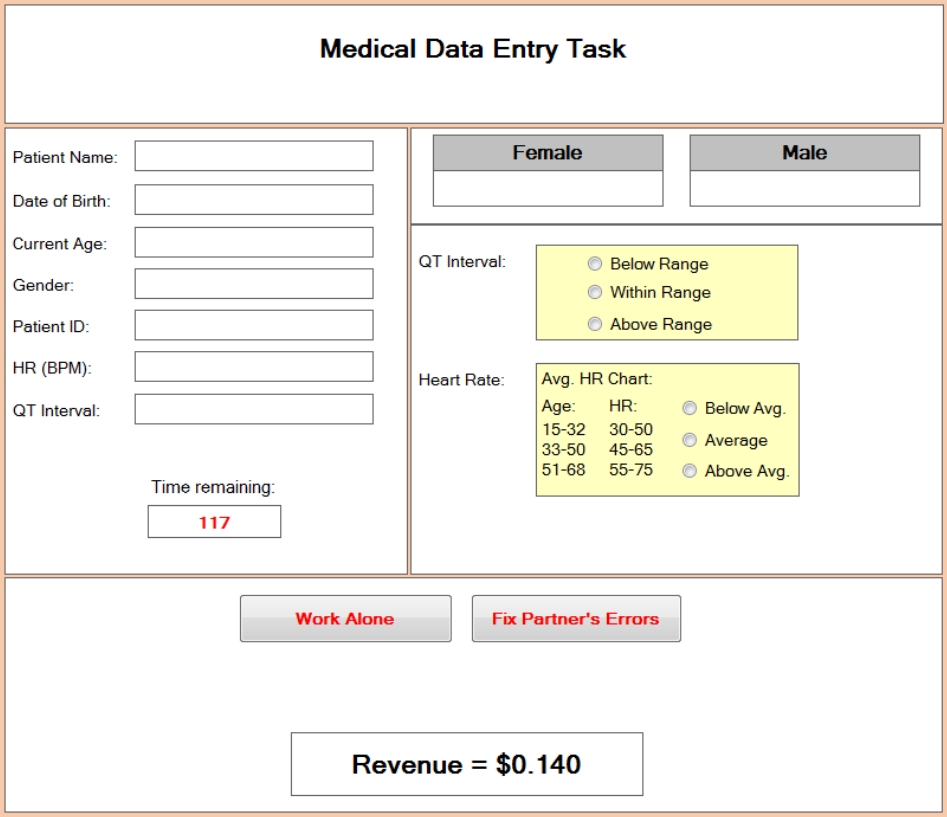
There will also be a counter on the screen illustrating these earnings.

Lastly, you will notice that the background color changes – you'll want to pay attention to these colors since it's related to how you get paid in the work task.

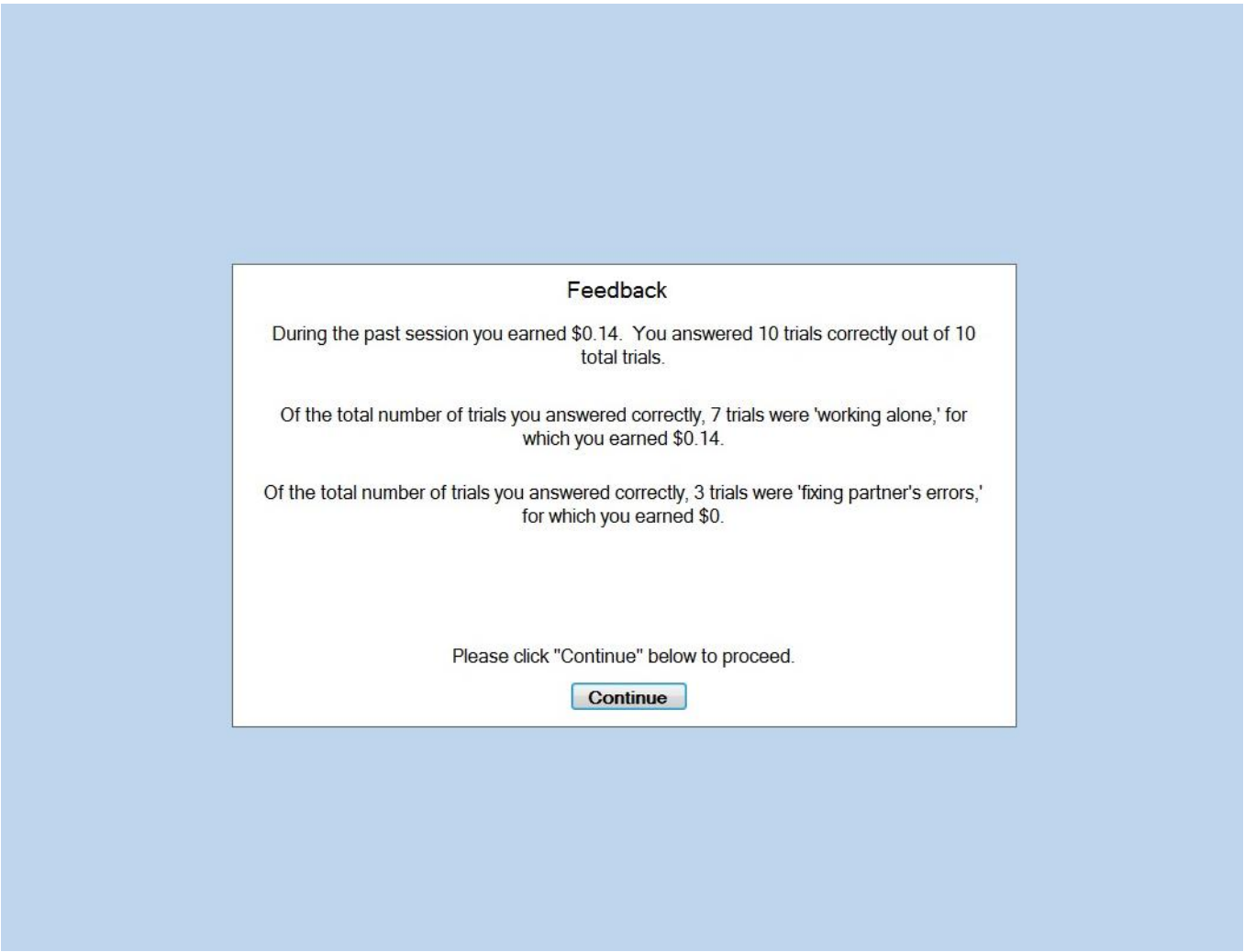
Any Questions?

We will begin with a series of practice trials. When they are complete a message will appear saying that you are done and to get the experimenter. You will then come and get me and I will start you on the actual experiment. At the end of the entire work session you will be given a survey that will ask you questions about your experience during the study.

Appendix F
EKG Data Entry Task



Appendix G
EKG feedback screen



Appendix H

Post-experiment questionnaire

1. During the task, did you primarily work alone or fix partner errors?

    a. Primarily worked alone
    b. Primarily fixed partner errors
    c. I don't know

2. If you primarily worked alone or primarily fixed partner errors, why did you choose to do so?

3. Did you think that one of the two tasks (working alone or fixing partner errors) was more difficult than the other?

    a. Working alone seemed more difficult
    b. Fixing Partner Errors seemed more difficult
    c. They seemed relatively equal in difficulty

4. Did you notice the background color changing?
    a. Yes
    b. No

5. What did you think it meant when the background color changed?

6. Not getting paid to fix my partner's errors:

    a. Did not affect my level of cooperation
    b. Increased my level of cooperation
    c. Decreased my level of cooperation
    d. None of the above

    If none of the above, please specify:

7. How motivated were you by the money you were earning?
    a. Not at all
    b. A little
    c. Somewhat
    d. Very much

8. There were written statements that were posted throughout the experiment. Did you notice the statements?
    a. Yes
    b. No

9. What was your reaction to the statements presented on the screen?

10. The statements:

    a. Did not affect my level of cooperation
    b. Increased my level of cooperation
    c. Decreased my level of cooperation
    d. None of the above

    If none of the above, please specify:

11. Had you heard anything about this study before participating?

a. Yes
b. No

If yes, what had you heard before participating in the study?

12. What was your main motivation for participating in this study?
    a. SONA Credit
    b. Research Experience
    c. Money
    d. Other

    If other, please specify:

13. Please select the following you most identify with:
    a. Female
    b. Male
    c. Transgender
    d. Prefer not to answer

14. Age:
    a. 18-25
    b. 26-35
    c. 36-45
    d. 45+
    e. Prefer not to answer

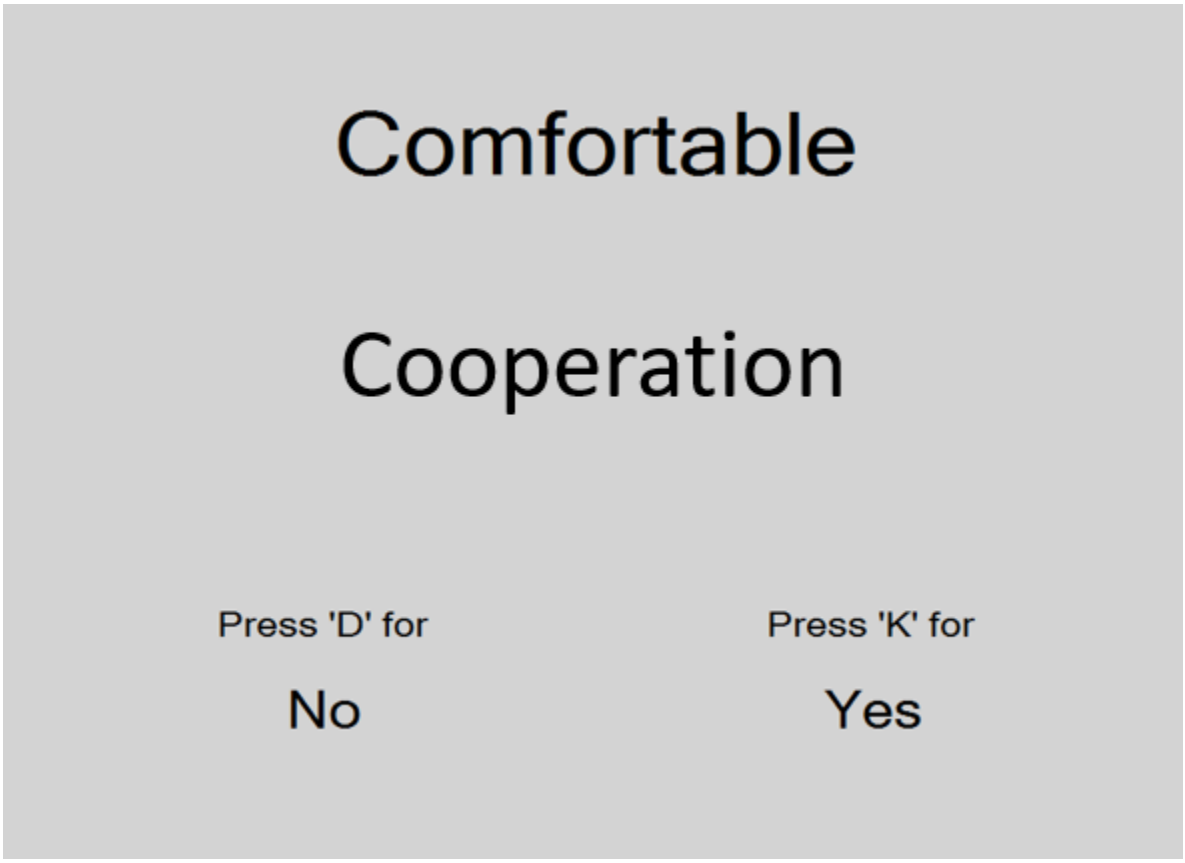
15. Did you think your partner in the task was a real person?

16. How did your belief about your partner being a real person affect your cooperative behavior?

17. Any other observations or comments about this study?

Appendix I

IRAP Screenshot



Appendix J
Participant Debriefing Form

Assessing the Differential Effects of Varying Stimuli on Cooperative Responding in an Analogue Work Task

When examining workplace behavior, literature has historically focused on behaviors related to employee performance as they relate to an organization's bottom line. These include safety behaviors, behaviors related to customer service, productivity, efficiency, etc. Additionally, it is believed that the cultural practices or activities related to an organization's employees, such as cooperation and problem solving may also be considered valuable (Rafacz, 2010).

The present study addresses how varying stimuli may influence cooperative behavior in the workplace. More specifically, this study differentially assessed cooperative responding under various pay contingencies and through the presentation of motivational statements. In doing so, conditions presented stimuli aimed to increase cooperative responding by displaying statements related to cooperation being valued, and some conditions displayed neutral statements aimed to maintain general productivity and attention to the task.

If you are interested in this area of research, the following sources are recommended for review:

- Hayes, S. C., Barnes-Holmes, D., & Roche, B. (Eds.). (2001). *Relational frame theory. A post-skinnerian account of human language and cognition.* New York: Kluwer Academic/Plenum Press.
- Houmanfar, R., Rodrigues, N. J., & Smith, G. S. (2009). Role of communication networks in behavioral systems analysis. *Journal of Organizational Behavior Management, 29,* 1-19.
- Maglieri, K. (2007). Evaluation of performance under various pay systems. Unpublished doctoral dissertation, University of Nevada, Reno, Reno, NV, USA.
- Rafacz, S. Assessing the differential effects of pre-existing verbal relations, pay for performance, and rules on cooperative responding. Unpublished doctoral dissertation, University of Nevada, Reno, Reno, NV, USA.
- Candido, A.M. Assessing the differential effects of group and individually-determined motivative augmentals on cooperative responding. Unpublished thesis, University of Nevada, Reno, Reno, NV, USA

If you have any complaints, concerns, or questions about this research, please feel free to contact Alison Szarko or Ramona Houmanfar, Ph.D. directly at aszarko@nevada.unr.edu or ramonah@unr.edu respectively.

Thank you again for helping us with this research!

Appendix K

EKG data entry task with three areas of interest highlighted