SOCIAL EFFECTS ON MEMORY: INTERDEPENDENCE

by

ESRA AYBIKE MUTLUOGLU

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Committee Members:

Asst. Prof. Terry Eskenazi

Prof. Sami Gulgoz

Prof. Natalie Sebanz

Koc University

Graduate School of Social Sciences and Humanities

This is to certify that I have examined this copy of a master's thesis by

Esra Aybike Mutluoğlu

and have found that it is complete and satisfactory in all respects,

and that any and all revisions required by the final

examining committee have been made.

Committee Members:

Asst. Prof. Terry T. Eskenazi

Prof. Sami Gülgöz

Prof. Natalie Sebanz

Date: 31.07.2018

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Signed Esra Aybike Mutluoglu

THESIS TITLE: SOCIAL EFFECTS ON MEMORY: INTERDEPENCE

ABSTRACT

Research has shown that when people perform a task with others, they incidentally encode co-actor relevant information in the task as a result of task co-representation. However, it is largely unknown what happens to individuals' memory in joint tasks when individuals are interdependent to each other in terms of goal attainment, namely in cooperative and competitive situations. In the present study, we examined the effect of each social context (independence vs cooperation vs competition) on individuals' encoding of the co-actor relevant information. Our results suggest that individuals in a cooperative relationship recall co-actor relevant information better than information non-relevant to any party because cooperation enhances self-other integration, which in turn makes task co-representation more likely. Conversely, individuals in the competition condition do not show an enhanced recall performance for co-actor relevant information compared to information non-relevant to any party, due to low self-other integration that obstructs task co-representation. Furthermore, the present study contributes to the debate of whether individuals co-represent *what* co-actor is supposed to do (task co-representation) or they co-represent *that* another agent is responsible for part of the task, and *when* it is his turn (actor co-representation account) by providing evidence supporting the task co-representation account.

Keywords: task co-representation, joint memory, cooperation, competition, interdependence, self-other integration, transactive memory

TEZ BAŞLIĞI : BELLEK ÜZERİNDEKİ SOSYAL ETKİLER: BAĞIMLILIK

ÖZET

Çalışmalar göstermektedir ki bireyler başka bir kişiyle birlikte bir görevi yerine getirdiklerinde partnerlerinin görevini de zihinlerinde temsil ederler ve bu durum partnerlerinin göreviyle alakalı bilgileri tesadüfi olarak belleklerinde kodlamalarını sağlar. Fakat bireylerin başka bir kişiyle bir görevi yerine getirirken amaçlarına ulaşmak için birbirlerine bağımlı oldukları sosyal bağlamların (iş birliği ve rekabet) belleği nasıl etkilediği literatürde çalışılmamıştır. Bu yüzden bu çalışmada bireylerin amaçlarına ulaşmak için birbirlerine bağımsız ve bağımlı olduğu sosyal bağlamların partnerlerinin göreviyle alakalı bilgilerin belleğe kodlanmasını nasıl etkilediklerini araştırdık. Bireyler birbirleriyle iş birliği halinde olduklarında partnerlerinin göreviyle ilgili bilgiler için bellek performanslarında bir gelişme gözlemledik çünkü iş birliği bağlamı bireylerin zihinsel temsilleri arasındaki örtüşmeyi arttırmakta ve partnerlerinin görevlerini de kendi görevleriymiş gibi zihinlerinde temsil etmelerini sağlamaktadır. Fakat birbirleriyle rekabet halinde oldukları bağlamlarda bireyler partnerlerinin görevleriyle ilgili bilgileri için yüksek bir bellek performansı göstermediler. Çünkü rekabet bireylerin zihinsel temsillerindeki örtüşmeyi zayıflatan ve partnerin görevinin zihinsel temsilini engelleyen bir sosyal bağlamdır. Ayrıca başka kişilerle yerine getirilen görevlerde bireylerin aslında zihinlerinde partnerlerinin görevini mi yoksa başka bir bireyin daha bu görevdeki varlığını ve görev sırasını mı temsil ettikleri literatürde hala tartışılmaktadır. Bu çalışmada deneyimizde bazı modifikasyonlar yaparak bu soruya cevap aradık ve bireylerin partnerlerinin görevlerini temsil ettiğini gösteren bulgulara ulaştık.

Anahtar Sözcükler: ortak görev temsili, sosyal bellek, iş birliği, rekabet, bağımlılık, öz-özge bütünleşimi, geçişken bellek

DEDICATION

This thesis is dedicated to my beloved parents who always supported me whatever path I took

and

Arda Sahin for his love and endless faith in me.

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CHAPTER 1

1. INTRODUCTION

1.1. General Overview

Early research on memory has usually examined individuals in an isolated way by neglecting the effect of social context on one's cognitive processes. However, individuals frequently form and retrieve their memories in the company of others. They also collaboratively remember with others, especially their shared experiences. When necessary individuals might also benefit from each other's memories. Therefore, it is by now established in the literature that memory is highly influenced by social context (Rajaram & Pereira-Pasarin, 2010).

Social context can have different influences on memory processing. For instance, remembering with others doesn't always benefit individuals, such that collaborative groups usually perform worse than nominal groups in recalling items that were studied individually (Basden, Basden, Bryner, & Thomas III, 1997; Basden, Basden, & Henry, 2000). It has been suggested that this is due to individuals' idiosyncratic retrieval strategies which interfere with those of others during collaborative recall. Put differently, because individuals develop personal and unique retrieval strategies, collaborative remembering causes these strategies to be disrupted by others' strategies and outputs. This effect is referred to as *collaborative inhibition* in the literature (Weldon & Bellinger, 1997). However, collaborative inhibition is found to disappear when group members are imposed a specific organizational strategy or a clear division of responsibility (i.e. category assignments), in which case people's retrieval strategies do no longer interfere with each other (Basden et al., 1997). Shared encoding can also improve collaborative recall performance because when individuals encode the same stimulus together, they are more likely to develop similar retrieval strategies (Harris, Barnier, & Sutton, 2013). In addition, subsequent individual recall performance is found to be enhanced for participants in collaborative groups (Basden et al., 2000; Blumen & Rajaram, 2008; Congleton & Rajaram, 2011). That is because items that would otherwise be forgotten, are also remembered individually when those items were recalled by co-actors during collaborative recall.

However, there are other instances where individuals' retrieval strategies do align. As people in a group get to know each other's domains of expertise or assigned responsibilities, each individual processes and holds non-overlapping sets of information (Wegner, 1987; Wegner, Giuliano, & Hertel, 1985). This so called *transactive memory system* enables group members to use their combined cognitive capacities efficiently by offloading some information to the other member as an external memory storage. Prior research shows that when they are not able to negotiate their retrieval strategies during learning, transactive memory partners have better collaborative recall performance than nominal groups (Hollingshead, 1998a; Wegner, Erber, & Raymond, 1991). This is explained by their pre-formed encoding strategies, which prevent possible overlaps of information encoded by partners. Therefore, transactive memory systems usually emerge in intimate couples, family members, or teams in organizations, who have cohabitated long enough to get to know each other (Moreland, Argote, & Krishnan, 1996; Moreland & Myaskovsky, 2000; Wegner et al., 1991).

Another line of research has recently investigated how individuals' memory processing are shaped in joint task instances when there is no intention to perform a memory task subsequently. Specifically, one's encoding of the information during a task is affected by whether the person performs the task alone or alongside another person, such that stimulus relevant only for a co-actor is recalled better than a stimulus that is non-relevant to any party (Eskenazi, Doerrfeld, Logan, Knoblich, & Sebanz, 2013). This enhanced memory performance for co-actor relevant information is considered a consequence of shared task representations that individuals form when acting jointly. Prior research suggests that acting together shapes people's task representations differently from acting alone, such that individuals in a joint task paradigm represent each other's task and integrate it into their own task representations as if they are also in charge of the co-actor's part. (Sebanz, Knoblich, & Prinz, 2003, 2005). As a result, representing a co-actor's part of the task improves one's recall for co-actor relevant information. Crucially, the enhanced memory performance for co-actor relevant information is still observed even when participants are incentivized not to focus on the co-actor's task (Eskenazi et al., 2013). Last, because individuals don't underperform in recalling self-relevant items in acting together compared to when they perform the task alone, authors suggest that task co-representation is a spontaneous and cognitively effortless process.

In short, it has been shown that individuals incidentally encode co-actor relevant information when they perform joint tasks as a result of task co-representation. One question that could follow from this finding is how people would represent each other's tasks and encode the other-relevant information when they have interdependent goals, such as in cooperative or competitive relationships. Although there are studies investigating the effect of such social contexts in the joint action literature, it is largely unknown whether social context (particularly cooperation vs competition) modulates one's memory performance for self-relevant and co-actor relevant information. Because people frequently perform joint tasks in cooperative and competitive settings in daily life, we believe that how each context affects one's encoding of the information is a nontrivial and novel question.

Specifically, cooperation is defined as a situation where goal attainment of individuals are linked so that the partnered individuals seek an outcome that is beneficial for each party (Deutsch, 1949). In other words, a cooperative setting is considered a positive interdependence among individuals because success of individuals promotes the achievement of joint goals. On the other hand, competition is considered a negative interdependence because goals of individuals are linked in a way that one's goal attainment negatively impacts that of the other (Johnson & Johnson, 1989). Because each social context might modulate individuals' memory processes differently, the present study aims to examine the effect of each interdependent setting on individuals' memory performance for self-relevant and co-actor relevant information. In the following, we will revisit two different accounts, from joint action and memory literatures, each of which affords contradictory predictions regarding cooperation and competition in joint tasks. The present study will enable us to understand which account explains the mechanism that underlies the encoding processing in joint action settings.

1.2. Joint Action Literature: Self-Other Integration

Task co-representation is described as a spontaneous process in which people represent co-actor's task and integrate it in their action plan as if they are also in charge of the co-actor's task (Sebanz et al., 2003, 2005). The general finding in task co-representation studies is as follows: When a task is divided between a pair of individuals, individuals slow down when responding to a stimulus with incongruent attributes, even though one of the attributes is not relevant for their own task but only relevant to the co-actor's task. However, when individuals perform the same task alone, this slowdown effect disappears. Therefore, it has been suggested that the slowdown effect observed in the joint condition is a consequence of task co-representation. Specifically, simultaneous representations of both self and of co-actor's task cause individuals to experience response selection conflict even though they are not required to act on the attribute that co-actor is responsible for; which in turn leads individuals to slow down in their responses. Because prior research originally recruited the

Simon task to investigate task co-representation, the slowdown effect is commonly known as the Social Simon Effect (SSE) in the literature (Sebanz et al., 2003).

Task co-representation is explained in terms of self-other integration mechanism, which refers to overlapping of representations of the self and representations of the other. Accordingly, the higher the degree of overlap, the more individuals integrate their co-actors' tasks into their task representation, which results in a stronger slow-down effect. Prior research shows that self-other integration could be manipulated in a number of ways. For instance, the SSE gets stronger when participants are primed by interdependent self-construals, because those with an interdependent self are more likely to integrate others into their self-representations (Colzato, de Bruijn, & Hommel, 2012). In a similar vein, group membership also modulates the degree of self-other integration such that the SSE is found to be absent when participants perform the task with outgroup members. That is because outgroup members are perceived to be dissimilar to the self, which obstructs task co-representation (Müller et al., 2011). However, when perceived similarity is increased by a perspective taking manipulation prior to the actual task, the SSE is enhanced due to higher self-other integration. Another study also shows that individuals' perspective taking skills predict the magnitude of the SSE to a greater extent for friends than for strangers (Ford & Aberdein, 2015); which could be again explained by the higher self-other integration in the former group.

Furthermore, the valence of the relationship with the other modulates self-other integration. For instance, while a positive, friendly relationship with a co-actor facilitates the SSE, a negative, intimidating relationship with a co-actor hinders the effect; as the degree of self-other integration increases or decreases in these cases, respectively (Hommel, Colzato, & van den Wildenberg, 2009). Similarly, a stronger SSE is observed when individuals perform the task with their romantic partner compared with a friend or opposite sex because romantic love strengthens self-other integration (Quintard, Jouffre, Croizet, & Bouquet, 2018). Behavioral and EEG measures also suggest that oxytocin induced individuals show stronger SSE since oxytocin, social bonding hormone, leads to increased self-other integration between individuals (Ruissen, & de Bruijn, 2015). Consistent with the self-other integration account, it has been also shown that when asked to make me/not-me decisions for traits, people are slower in responding to traits that they didn't share with their spouses, compared to traits that they shared with their spouses (Aron, Aron, Tudor, & Nelson, 1991).This is because positive relationship with one's spouse enhances self-other integration; which in turn decelerates individuals' response to traits that were not shared with their spouses. The degree of people's neural responses to observed errors is also modulated by the relationship between the self and other such that stronger activation of the anterior cingulate cortex is observed when people observe errors of their friends compared to those of strangers due to high self-other integration in the former (Kang, Hirsh, & Chasteen, 2010).

Finally, interdependent contexts are also relevant for the self-other integration mechanism because people perceive others as more similar to themselves in cooperative settings than in competitive settings (Toma, Yzerbyt, & Corneille, 2010). Accordingly, while cooperation facilitates the slowdown effect in joint tasks due to high self-other integration, the effect weakens in competition due to low self-other integration (de Bruijn, Miedl, & Bekkering, 2008; Iani, Anelli, Nicoletti, Arcuri, & Rubichi, 2011; Iani, Anelli, Nicoletti, & Rubichi, 2014; Ruissen & de Bruijn, 2016). Supporting self-other integration account, Wittmann et al. (2016) also found that when people cooperate with successful or poor performers, their estimates about their own abilities gets inflated or reduced, respectively, due to high self-other integration as a consequence of cooperation. However, this effect reverses in competitive settings as expected.

Returning to the joint memory task setting, one would expect that cooperation enhances one's encoding of co-actor relevant information due to high self-other integration. However, individuals in a competitive setting would not integrate a co-actor's part into their own task representation to the same degree as compared to the cooperative context as a result of low self-other integration. Consequently, encoding of co-actor relevant information would be less likely in such competitive contexts. However, there is an alternative account offered by the memory literature which affords contradicting predictions with respect to the effects of cooperative and competitive social contexts. This is discussed in the following.

1.3. Memory Literature: Transactive Memory

In a transactive memory system the individual processes the information and becomes the source of that information for other group members if upcoming information is within one's expertise area or assigned responsibility (Wegner et al., 1991; Wegner et al., 1985). If not, the person only needs to know the source of the information to access it when necessary. In doing so, individuals do not waste their cognitive resources to manage information unfamiliar or irrelevant to them, thereby benefiting from each other's memory in an efficient way. In other words, they only focus on the information that is relevant to their domain of expertise or responsibility instead of monitoring information relevant for another member in the group; which enables them to access that information without processing and encoding the information itself. However, one's failure in retrieving information for which he is responsible causes a loss in the group memory. Consequently, all group members are expected to remember the information that belong to their assigned domains for the transactive system to benefit each individual; which makes the relationship between group members cooperative.

It often takes time for a transactive memory system to emerge since individuals need to learn each other's domains of expertise or assigned responsibilities. Therefore, transactive memory has mostly been studied in intimate couples or teams in organizations who get to know each other over time (Moreland et al., 1996; Moreland & Myaskovsky, 2000; Wegner et al., 1991). Beyond some default inferences that people could make about others' knowledge domains based on stereotyping information such as age or gender in daily life, transactive memory partners distinctively know each other's knowledge areas owing to the frequent communication and updating of information among the partners (Wegner et al., 1991). However, it has also been found that even strangers could develop such a system by performing the task repeatedly since they start establishing expertise domains for each individual in the group (Hollingshead, 1998b). Therefore, it is plausible that transactive memory system doesn't necessarily require a shared history if parties are assigned to specific responsibilities in a structured way in the first place. In other words, explicitly specifying each actor's responsibility prior to a cooperative joint task might be sufficient for such a distributed cognitive system to emerge.

Based on this logic, one could argue that a cooperative joint action could shape one's encoding of the information differently than what Eskenazi et al. (2013) found in the previous study in which actors work independently of each other. Transactive memory systems emerge in a cooperative setting in which there is a structured division of responsibilities assigned to group members to effectively use their cognitive resources by benefiting from each other's memory, thereby making optimal decisions as a group. In a similar vein, if a joint task is structured in a way that actors perform the task cooperatively to achieve a shared goal in the presence of an explicit task sharing, this setting could lead them to treat each other as transactive memory partners. Correspondingly, they don't encode co-relevant information to the same degree as they would do in the independent condition. Therefore, although it has been argued that task co-representation is a spontaneous and cognitively costless process that occurs even individuals are incentivized against it (Eskenazi et al., 2013), the new emergent transactive system might somehow suppress this process and make encoding of the co-actor relevant information less likely. Accordingly, transactive memory account predicts that one’s memory performance for co-actor relevant information decreases in a cooperative setting compared to when actors are independent to each other as in the study of Eskenazi et al. (2013).

Along the same line, one could expect the opposite mechanism for a competitive setting. When people treat each other as transactive memory partners, they don’t process the information that co-actor is responsible for. In other words, the degree of monitoring of the co-actor relevant information decreases when transactive memory system emerges. On the other hand, individuals in a competitive context are likely to monitor and evaluate their rivals’ performance and adjust themselves accordingly while performing a joint task. That is because competitive settings in particular necessitate comparison between actors’ performances to determine their relative ranks at the end. Thus, one would predict that competition enhances one’s encoding of co-actor relevant information.

However, this is not to say that monitoring task partners is unique to competition. Individuals monitor their co-actors’ performances in both cooperative and competitive settings because co-actor performance is relevant for individuals in both contexts: one’s success is rewarding for others in cooperation, while it obstructs goal attainment of others in competition (de Bruijn & von Rhein, 2012; de Bruijn, Mars, Bekkering, & Coles, 2012; Koban, Pourtois, Bediou, & Vuilleumier, 2012; Koban, Pourtois, Vocat, & Vuilleumier, 2010; Castellar, Notebaert, Van den Bossche, & Fias, 2011). Therefore, both settings require monitoring of self and the co-actor because individuals modify their strategies and actions according to others’ performance in joint tasks. Nevertheless, we believe that the degree to which people monitor their co-actors during a joint task might differ according to the nature of the relationship. That is because comparison of individuals' performances is more salient in a competitive setting to determine their respective outcomes, which would make individuals more inclined to monitor their co-actors. Thus, it is plausible to expect that individuals in a competitive relationship tend to monitor their co-actors more intensely than they do in cooperative or independent settings. Correspondingly, one's memory performance for co-actor relevant information is expected to be higher in a competitive context than both cooperative and independent settings. If there is such a difference in the degree of monitoring for others between competition and cooperation, the present study enables us to examine this difference by looking at individuals' memory performance for co-actor relevant information.

1.4. Summary of the Predictions

To sum up, two accounts, namely the self-other integration and the transactive memory accounts, afford contradicting predictions for the encoding of co-actor relevant information regarding cooperative and competitive settings. Self-other integration account predicts that memory performance for co-actor relevant information is enhanced in a cooperative context but reduced in a competitive context due to high and low self-other integration, respectively. Conversely, transactive memory account predicts that memory performance for co-actor relevant information decreases in the cooperative context because cooperation with a structured responsibility division causes individuals to treat each other as transactive memory partners; therefore, they are less likely to monitor each other's information. However, competition is likely to increase the tendency for monitoring of the co-actor, which in turn enhances memory performance for co-actor relevant information.

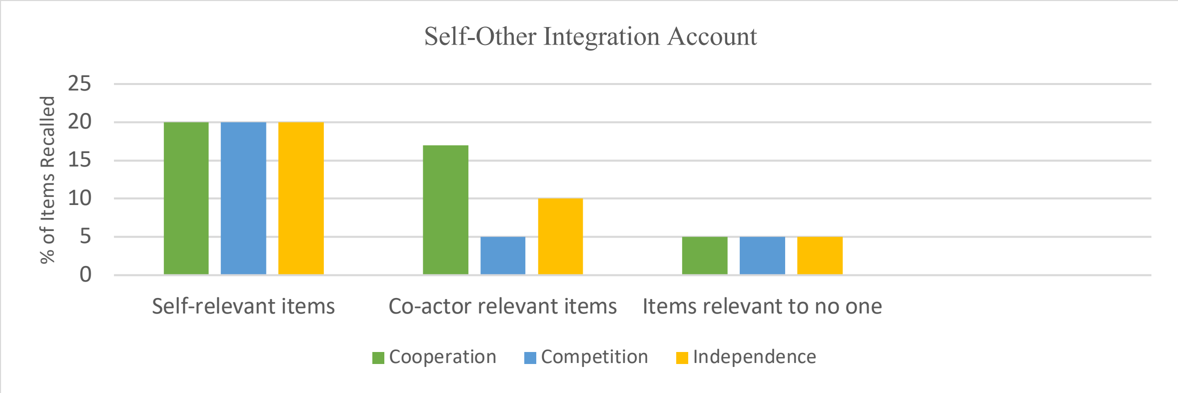

Figure 1. Predictions of individuals' recall performance based on Self-Other Integration Account, shown separately for each social condition and category.

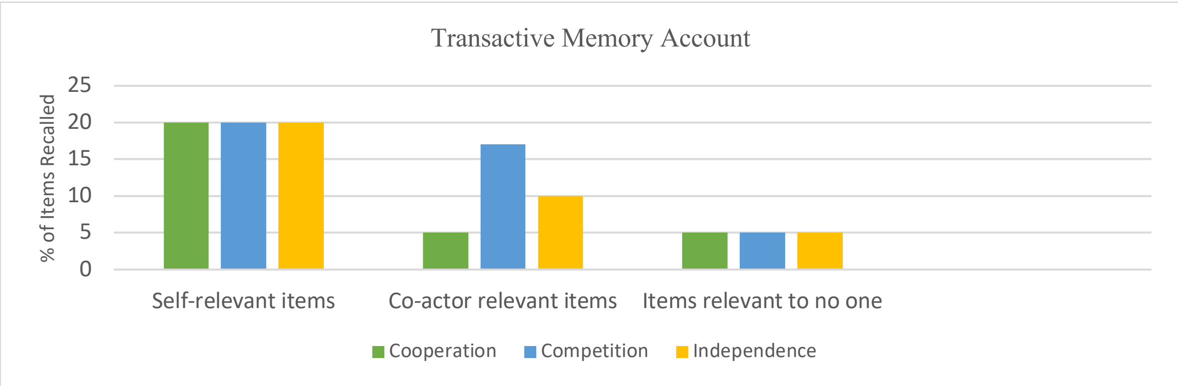

Figure 2. Predictions of individuals' recall performance based on Transactive Memory Account, shown separately for each social condition and category.

Although it is not reported, participants in the original study were also asked to perform a recognition task to test whether co-representation effect is also present in individuals' recognition performance. However, participants did not recognize co-actor relevant items better than items non-relevant to any party in the joint condition (unpublished data). On the other hand, we suspected that co-representation effect might reveal itself on individuals' recognition performance in the present study because our social context manipulation for the interdependent settings makes performance of the co-actor more relevant for the individuals. Therefore, based on the self-other integration account, it is expected that individuals will show enhanced recognition performance for co-actor relevant information due to high self-other integration. In contrast, transactive memory account predicts that individuals in the competition condition will show enhanced recognition performance for co-actor relevant information due to high degree of monitoring the co-actor.

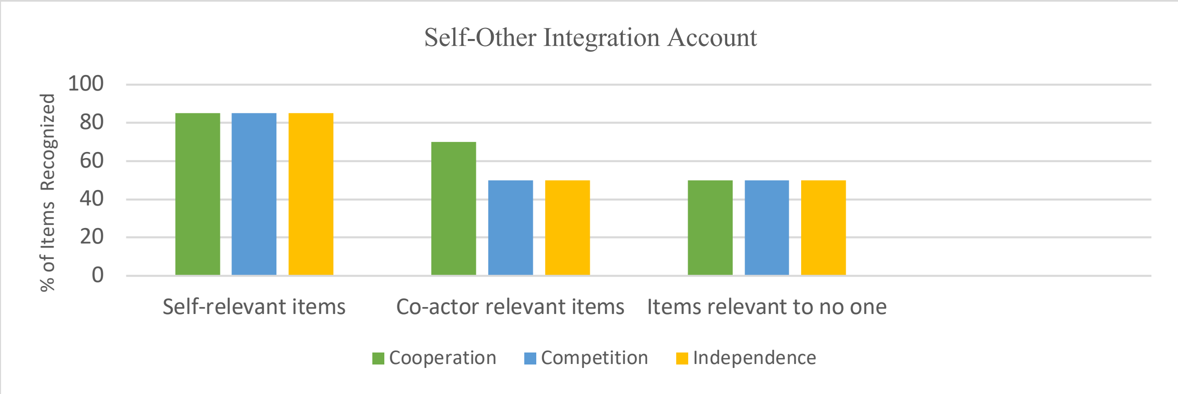

Figure 3. *Predictions of individuals' recognition performance based on Self-Other Integration Account, shown separately for each social condition and category*.

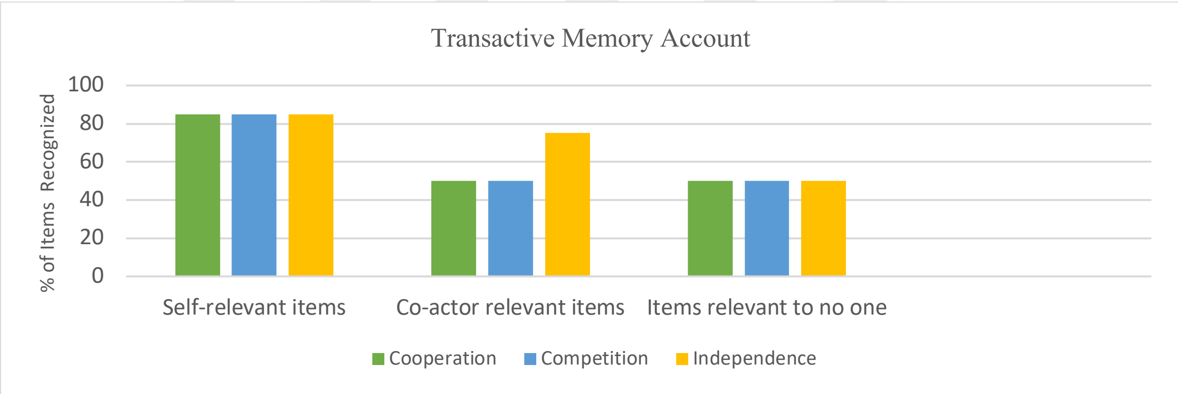

Figure 4. *Predictions of individuals' recognition performance based on Transactive Memory Account, shown separately for each social condition and category*.

1.5. Shared Representations in the Joint Action: Task Co-representation and Actor Co-representation

The second aim of this study is to address the nature of co-representation. The question of which aspects of the co-actor's contributions people represent in a joint task setting is still being debated in the literature (for an overview, see Obhi, & Sebanz, 2011; Wenke et al., 2011). *Task co-representation* account suggests that individuals in joint task settings co-represent *what* the other person is supposed to do under certain stimulus conditions (i.e. self:

press 1 when red, partner: press 2 when blue), and vicariously respond to their partners' stimuli (Atmaca, Sebanz, & Knoblich, 2011; Sebanz, Knoblich, & Prinz, 2005). On the other hand, *actor co-representation* account suggests that participants co-represent *that* another person is responsible for the complementary task share, and *when* the other person has to respond (i.e. self: red, partner: blue) instead of representing *what* their partner is supposed to do (Philipp & Prinz, 2010; Wenke et al.,2011).

Recently, Baus et al. (2014) tested the task co-representation account in the context of speech production by using a picture naming task where individuals are expected to name the pictures when it is their turn, indicated by a color cue, which necessitates lexical processing of the self-relevant stimuli only. The critical question here was whether individuals would also engage in lexical processing of the stimuli when it is their co-actor's turn. This experimental paradigm allows to discern whether individuals only represent when a co-actor is required to act, which does not require lexical processing of the stimuli relevant to the co-actor (i.e. actor co-representation), or if they also represent what the co-actor is supposed to do by engaging in lexical processing of co-actor relevant stimuli (i.e. task co-representation). Behavioral and EEG measures revealed that participants engaged in lexical processing not only on their own trials but also on trials where their co-actors responded, indicating a strong evidence for task co-representation account.

The experimental paradigm described by Eskenazi et al. (2013), is similar in nature to that in Baus et al. (2014) in terms of dividing categories into three (self-relevant, other relevant and non-relevant) to observe the difference between no-go trials clearly. However, semantic categorization task in the study of Eskenazi et al. (2013) required individuals to process all stimuli semantically, irrespective of whether the stimuli belongs to their assigned category or not. Therefore, the nature of the task does not provide an answer whether people represented the other's stimulus or if they represent their task. In other words, if the task did not require individuals to engage in semantic processing for all stimuli beforehand like in the study of Baus et al. (2014), enhanced recall performance for co-actor relevant information would be a clear indication of task co-representation account because individuals semantically process co-actor relevant information (what the co-actor is needed to do) even when it is not required. However, because semantic processing was a prerequisite to categorize the stimuli in the original paradigm, it is also possible that enhanced recall performance for co-actor relevant information was a result of actor co-representation.

To clarify this, we modified the paradigm in a way that in addition to the semantic categorization task, our participants also performed a second categorization task based on perceptual features of the stimuli. Here, participants are assigned to one of three different perceptual feature categories, and only try to memorize those words that belonged to their perceptual category. By this way, participants are not obliged to engage in semantic processing of the stimuli unless it was relevant for their own task. If individuals still semantically process co-actor relevant information more so than information non-relevant to any party, we could confidently claim that this effect is observed as a result of task co-representation, that is, because they represented their partner's task which was to memorize the words with partner relevant perceptual features.

To summarize, the goal of the current study is two-fold. The first goal of the present study is to understand the influence of each social context (independence, cooperation, competition) on individuals' encoding of the information in joint task paradigms by testing different approaches affording contradicting predictions regarding cooperative and competitive settings. Furthermore, we also aim to contribute to the debate of "what" is actually shared in joint action settings by modifying the original paradigm to clearly see whether individuals still engage in semantic processing when they are not required to.

CHAPTER 2

2. METHOD

2.1. Overview of the Experiment

Particular changes were introduced to the original paradigm in the present study. Specifically, participants performed two different kinds of categorization task (semantic and perceptual categorization tasks) in order to investigate if social memory observed on joint tasks is due to task co-representation or actor co-representation. Furthermore, social context was modified in a way that one's performance influenced the other's outcomes either positively (cooperative condition) or negatively (competitive condition).

2.2. Participants

132 Koc University students participated in the experiment in exchange for course credit. Participants were recruited as pairs and randomly assigned to one of the three social conditions (independent, cooperation, competition). 47 participants were excluded from the data as they misperceived the social context manipulation (e.g. reporting that they perceived the task as cooperative even though placed the competition condition). We analyzed data from 28 participants in the cooperation condition, 28 participants in the competition condition, and 29 participants in the independence condition. In addition, one participant in the cooperation condition did not perform the recognition task.

2.3. Procedure

First, each pair of participants received the instructions together prior to the experiment. They were told that they would perform two different categorization tasks jointly; a semantic word categorization task and a perceptual word categorization task, the order of which was randomized. In addition, they were instructed that they are expected to recall items that they responded to in both categorization tasks in the subsequent recall test.

Social context was conveyed via instructions prior to the experiment. Specifically, participants in the cooperation condition were told that they are evaluated as a team during the experiment. Therefore, their recall performance will be averaged and they will be rewarded as a pair according to their average score at the end of the experiment. On the other hand, those in the competition condition were told that they will compete with each other in the recall task and the individual with better recall performance will receive extra monetary compensation. In order to strengthen the social context manipulation, we also asked participants to choose a color together to represent their team in the cooperation condition. In the competition condition, each participant chose a color to represent himself. Lastly, participants in the independence condition served as a control group; thus, they completed the all tasks without interdependent goals as opposed to other two conditions.

In the semantic word categorization task, each participant was assigned to one of three categories (animals, fruits & vegetables, household items) and instructed to respond only to the items belonging to their own category by pressing the indicated key. For the perceptual categorization task, the original paradigm was modified in a way that words were displayed either with a straight line, dashed line or dotted line underneath. Participants were assigned to one of three line categories to respond to. Therefore, participants were not obliged to process the other-relevant and non-relevant information semantically to perform the categorization task.

It should be noted that participants were shown different stimuli lists in each categorization task, meaning that each item is presented once to the participants. However, perceptual features were attached to items randomly irrespective of semantic category of the items. Therefore, while performing the perceptual categorization task, a participant who is assigned dotted line for the categorization responded to items from animal, fruits & vegetables and household categories.

The experiment comprised four phases: categorization tasks, distraction task, informed recall test, and recognition task. Throughout each categorization task, participants were presented with a total of 60 word items, 20 from each category. Each word remained on the screen for a maximum of 1500 ms, in black print on a white background, and disappeared once a response was collected. As participants performed the tasks jointly on the same computer, they were seated next to each other in chairs and used the same keyboard. After the categorization tasks, participants performed a distractor task to avoid any recency effects in the recall, in which they produced numbers with a predetermined rule for a duration of 3 minutes. Later on, participants performed the informed recall task. However, differently from the instructions that they received prior to the experiment, they were asked to recall as many items as possible from all categories regardless of the category assignments in both tasks. Following that, participants were asked to perform a recognition test, where they were asked to respond to the items that they previously saw in the categorization tasks. In this test participants saw 40 word items, one third of which was novel to the participants. The rest of the items was randomly shown from the two lists that participants saw in the perceptual and semantic categorization tasks. In the end, participants responded to some manipulation check questions, such as if they expected to recall items from their co-actor's category or to what extent the task was cooperative/competitive for them.

2.4. Stimuli

The stimulus materials consist of 120 Turkish word items selected from a database (Göz, 2003) and divided into two lists. There are 20 items for each word category in both lists. Words are matched across categories for their frequencies. Lists are randomly assigned to the semantic and perceptual categorization tasks. Two keys on the computer keyboard were assigned to participants (A and L), one for each in the categorization task. The response key-category pairings were also counterbalanced. Additionally, whether participants will perform firstly the semantic or perceptual categorization task was also randomized such that half of the participants performed the semantic categorization task first, while the other half performed the tasks in reverse order. For the recognition test, 60 additional words are selected and also matched across categories for their frequencies.

CHAPTER 3

3. RESULTS

3.1. Semantic Categorization Task

Recall. First, we analyzed participants' recall performance for items that they responded to for the semantic categorization task by conducting a 2x3 mixed Analysis of Variance (ANOVA) –within subject factor for the *Category* ("self" vs "no one") and between subject factor for the *Condition* (independence vs cooperation vs competition). Neither main effect of *Condition* (F (2,84) = .401, p = .671, ηp^2 = .010) nor interaction was significant (F (2,84) = .339, p = .713, ηp^2 = .008). However, the main effect of *Category* was significant (F (2,84) = 176.472, p < .001, ηp^2 = .683). Participants recalled self-relevant items significantly better than items that no one responded to in the semantic categorization tasks regardless of the social condition in which they performed the tasks.

In order to examine whether co-representation effect reveals itself in one's memory, we conducted a 2x3 mixed Analysis of Variance (ANOVA) –within subject factor for the *Category* ("other" vs "no one") and between subject factor for the *Condition*. Although there was a main effect of *Category*, the main effect of *Condition* and interaction effect did not reach significance [category: F (2,84) = 11.766, p < .01, ηp^2 = .125; condition: F (2,84) = 0.143, p = .867, ηp2 = 0.003; interaction: F (2,84) = .403, p = .669, ηp^2 = .010].

Although our ANOVA results did not reveal the interaction that we were looking for, we further explored our data and conducted some exploratory post hoc analyses to investigate a core effect separately in each social condition. To that end we compared individuals' recall performance of other-relevant information and non-relevant information in each social condition. Individual t-test results within each social condition were in line with the predictions of self-other integration account: In the cooperation condition, participants recalled items that their co-actor responded to significantly better than items that no one responded to (t (27) = 3.246, $p < .01$). This co-representation effect was marginal in the independent condition (t (28) = 1.947, p = .062). However, participants' recall performance for other-relevant items and non-relevant items did not differ in the competition condition (t (27) = 1.176, p = .250).

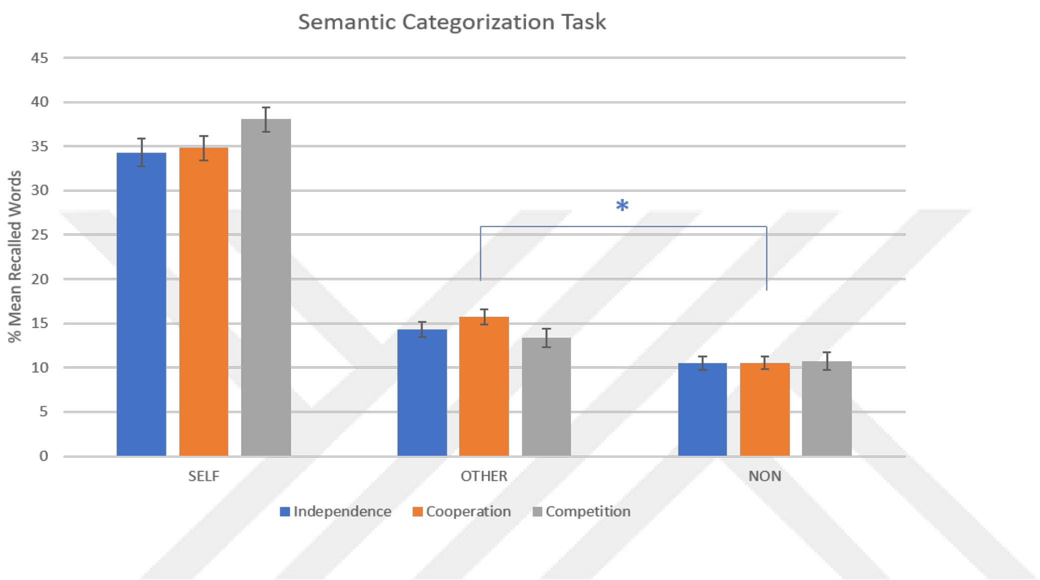

Figure 5. Mean percentage of words recalled from the semantic categorization task. Words belonging to a co-actor's category were recalled more frequently than words that no one responded to in the cooperation condition. This difference is marginal in the independent condition and absent in the competition condition.

Confabulation. We made a confabulation analysis based on semantic categories assigned to individuals for the semantic categorization task because in the perceptual task perceptual features were randomly assigned to items regardless of semantic categories of the items. 2x3 mixed ANOVA –within subject for the *Category* ("other" vs "no one") and between subject factor for the *Condition*- revealed that neither the main effect of *Category* nor the main effect of *Condition* turned out to be significant [category: F (2,84) = .703, p = .404, $\eta p^2 = 0.009$; condition: F (2,84) = 1.037, p = .359, ηp^2 = .025]. Therefore, it is quite unlikely that confabulated words might account for enhanced recall performance for co-actor relevant information.

Recognition. In the original study, co-representation effect did not reveal itself in individuals' recognition processes. However, we speculated that introducing interdependent goals in a joint task might modulate individuals' recognition performance for items that their co-actor was responsible for. As expected, 2x3 mixed ANOVA - within subject for the *Category* ("self" vs "no one") and between subject factor for the *Condition*- revealed that individuals recognized items that they responded to significantly better than items that no one responded in the semantic categorization task, regardless of the social condition in which they performed the tasks [category: F (2,83) = 57.693, $p < .001$, $\eta p^2 = 0.416$; condition: F (2,83) = .078, $p = .925$, ηp2 = .002; interaction: F (2,83) = 1.971, $p = .146$, ηp2 = .046].

To test our main prediction, we performed a 2x3 mixed ANOVA –within subject factor for the *Category* ("other" vs "no one") and between subject factor for the *Condition*. Main effect of *Condition* and the interaction did not reach significance [condition: F (2,83) = .246, $p = .783$, $\eta p^2 = .006$; interaction F (2,83) = .937, $p = .396$, $\eta p^2 = .023$)]. However, there was a main effect of *Category* (F (2,83) = 5.932, $p < .05$, $\eta p^2 = 0.068$). Post hoc t-test results showed that individuals in the cooperation condition recognized items that their co-actor was responded to significantly better than items that no one was responsible for (t (26) = 2.330, $p < .05$). Conversely, this co-representation effect was absent in both independence and competition condition [independence: t (28) = 1.261, $p = .218$; competition: t (27) = .528, $p = .602$].

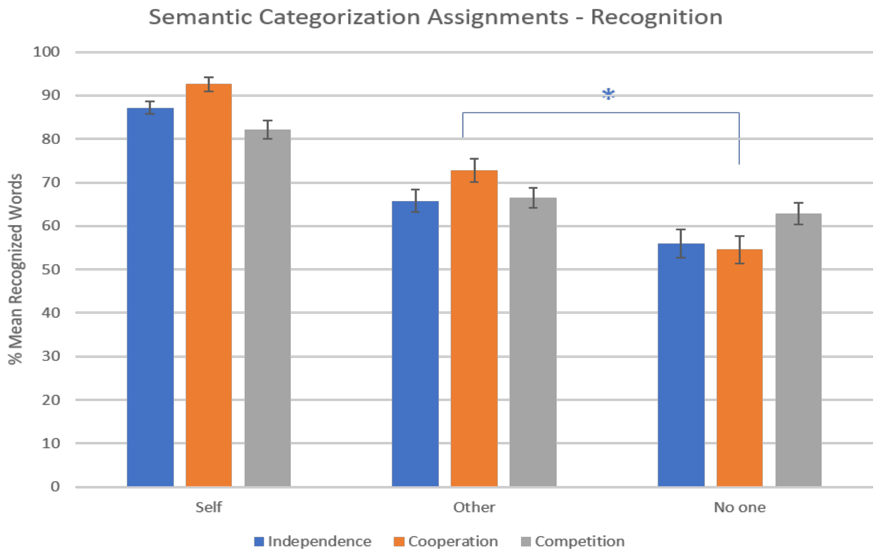

Figure 6. *Mean percentage of words of semantic categorization task recognized*. *Words belonging to a co-actor's category were recognized more frequently than words that no one responded to in the cooperation condition*. *This difference was absent in other conditions*.

Reaction Time. Finally, we also checked whether there is a difference in participants' reaction times across social conditions in both tasks. Our ANOVA results revealed that individuals' reaction times did not differ across social conditions in the semantic categorization task. (F (2,84) = .034, p = .967).

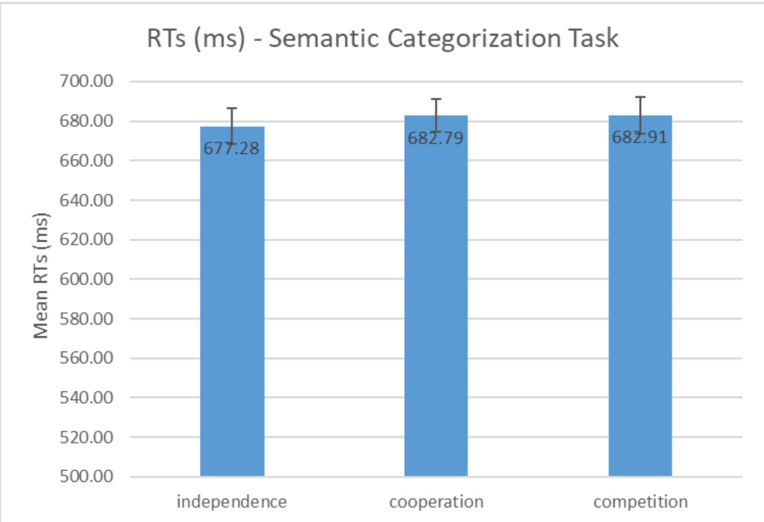

Figure 7. *Mean of reaction times of the individuals to the items in the semantic categorization task*. *Individuals' reaction times to their items did not differ across conditions*.

3.2. Perceptual Categorization Task

Recall. As expected, participants recalled items that they responded to significantly better than the items that no one responded to regardless of the condition that they were assigned [category: F (2,84) = 148.833, $p < .001$, $\eta p^2 = .645$; condition: F (2,84) = 1.652; $p = .198$, ηp2 = .039; interaction: F (2,84) = .079; $p = .924$, ηp2 =.002].

To examine whether there is a co-representation effect when individuals are not required by the task to semantically process information that co-actor was responsible for, 2x3 mixed ANOVA –within subject factor for the *Category* ("other" vs "no one") and between subject factor for the *Condition* was conducted. Both main effects of *Category* and *Condition* were significant although there was no significant interaction [category: F (2,84) = 7.282, $p < .01$, $\eta p^2 = 0.082$; condition: F (2,84) = 5.647, $p < .01$, $\eta p^2 = .121$, interaction: F (2,84) = .243, p = .785, $\eta p^2 = .006$]. Our post hoc t-test results showed that individuals recalled co-actor relevant information better than information non-relevant to any party even when they are not obliged to process other-relevant information semantically in the independent condition (t (28) = 2.703, $p < .05$). In other words, when one's performance does not affect the other's outcome in the task, individuals semantically processed co-actor relevant information significantly better than information that no one responded to even though they are not required to. However, in interdependent social conditions, when individuals have an effect on each other's outcome, it seems that they did not differentiate co-actor relevant information from information non-relevant to any party, indicating the absence of task co-representation. [cooperation: t (27) = 1.432, $p = .164$; competition: t (27) = .947, $p = .352$].

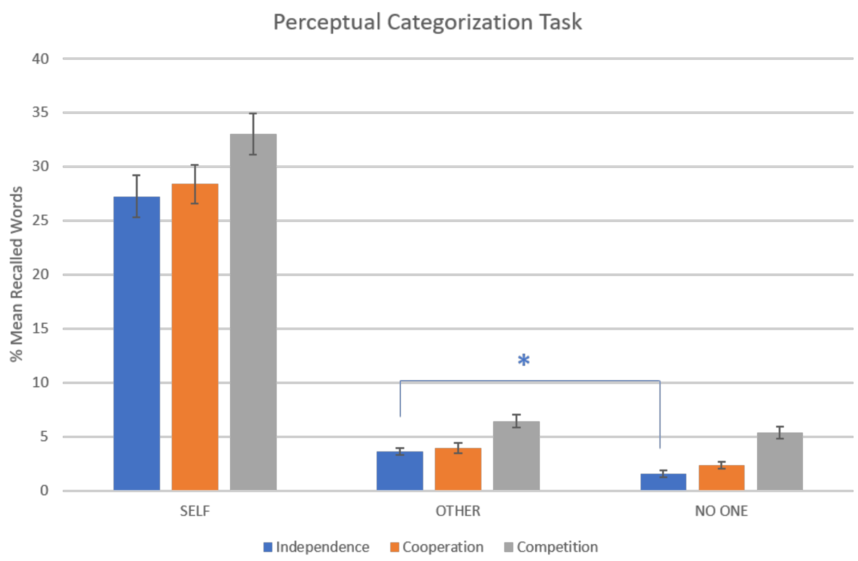

Figure 8. Mean percentage of words recalled from the perceptual categorization task. Words belonging to a co-actor's category were recalled more frequently than words that no one responded to in the independence condition. This difference was absent in the cooperation and competition conditions.

Recognition. Not surprisingly, individuals recognized items that they responded to significantly better than items that no one is responsible for regardless of the condition they were in [category: F (2,83) = 56.117, p < .001, ηp^2 = .409; condition: F (2,83) = 1.255, p = .290, ηp^2 = .03; interaction: F (2,83) = .941, p = .395, ηp^2 = .023].

However, there was no significant difference in individuals' recognition performance for items that co-actor was responsible for and items that no one was responsible for in none of the conditions. [category: F (2,83) = .033, p = .857, ηp^2 = .000; condition: F (2,83) = .006, p = .994, ηp^2 = .000; interaction: F (2,83) = 1.300, p = .278, ηp^2 = .031] Our post hoc comparisons also indicated the absence of co-representation effect across conditions. [independence: t (28) = 1.561, p = .130; cooperation: t (26) = -.869, p = .393; competition: t (27) = -.482, p = .633]

Reaction Times. While performing perceptual categorization task, individuals' reaction times were significantly different across social conditions in contrast to semantic categorization task (F (2,84) = 4.575, $p < .05$). Specifically, although the only significant difference is found between independence and competition conditions, there is a pattern suggesting that participants in the cooperation and competition conditions were slower in responding to their own items than those in the independence condition.

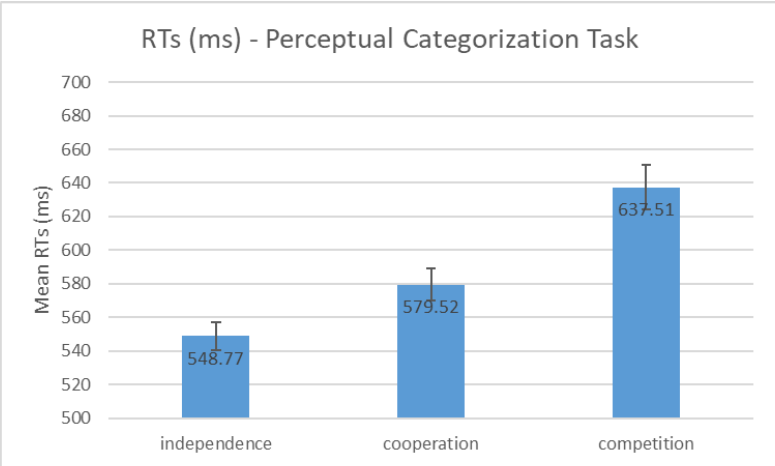

Figure 9. Mean of reaction times of the individuals to the items in the perceptual categorization task. Individuals were fastest in responding to their items in the independence condition and slowest in the competition condition.

Order Effects. We also checked whether the order of the categorization tasks influences individuals' memory performances. Recall that, whether participants will perform firstly the semantic or perceptual categorization task was randomized such that half of the participants performed the semantic categorization task first, while the other half performed the tasks in reverse order. To test for any order effects, we repeated our ANOVAs by including the order as an additional variable. Specifically, when we conducted 2x2x3 mixed ANOVA – within subject for *Category* (self vs no one) and between subject for *Order* and *Condition*, neither main effect of the order nor interaction between order and other variables turned out to be significant for both tasks [*Perceptual Task*: order: F (1,84) = .002, p = .968; condition * order: F (2,84) = 1.398, p = .253; category * order: F (1,84) = .027, p = .869; category * condition * order: F (2,84) = .550, p = .579; *Semantic Task*: order: F (1,84) = 2.565, p = .113; condition * order: F (2,84) = .144, p = .866; category * order : F (1,84) = .034, p = .855; category * condition * order : F (2,84) = 1.222, p = .300]. Similarly, to test any order effect for our main prediction, we also conducted 2x2x3 mixed ANOVA – within subject for *Category* (other vs no one) and between subject for *Order* and *Condition*- and did not find any main or interaction effect in both perceptual and semantic categorization task [*Perceptual Task*: order: F (1,84) = .148, p = .701; condition * order: F (2,84) = 1.213, p = .303; category * order : F (1,84) = 1.082, p = .301; category * condition * order : F (2,84) = 1.742, p = .182; *Semantic Task*: order: F (1,84) = 4.468, p = .078; condition * order: F (2,84) = 3.237, p = .095; category * order : F (1,84) = .009, p = .924; category * condition * order : F (2,84) = .743, p = .479]. These results show that participants' recall performance for both self and co-actor relevant information did not differ according to the order of the categorization tasks across social conditions.

CHAPTER 4

4. DISCUSSION

4.1. Overview of the Present Study and Discussion of the Findings

The present study investigated memory encoding in different task sharing contexts. Our first goal was to examine the influence of different social contexts (independence, cooperation and competition) on individuals' encoding of the information in joint task paradigms. Because the role of interdependent settings on individuals' memory processes has been neglected in the literature, we asked what would happen to individuals' encoding of co-actor relevant information in a joint task when they are cooperatively or competitively linked to each other.

To address this question, we revisited two different accounts from joint action and memory literatures, each of which affords contradicting predictions regarding cooperative and competitive settings. The self-other integration account (e.g. de Bruijn, Miedl, & Bekkering, 2008; Iani, Anelli, Nicoletti, Arcuri, & Rubichi, 2011; Iani, Anelli, Nicoletti, & Rubichi, 2014; Ruissen & de Bruijn, 2016) predicts that cooperation enhances memory performance for co-actor relevant information as a result of high self-other integration, while this effect disappears in competition due to low self-other integration. This is because the degree of the overlap between the representations of the self and the representations of the other is modulated by social context in a way that cooperation enhances self-other integration, while competition hinders it. Alternatively, the transactive memory account (Wegner et al., 1991; Wegner et al., 1985; Hollingshead, 1998b) suggests that the explicit division of the task shares between partners in joint task paradigms might lead individuals in a cooperative setting to treat each other as transactive memory partners, thereby making monitoring co-actor relevant information less likely. Accordingly, this account predicts enhanced recall performance for co-actor relevant information for individuals in the competition condition, while this effect disappears for those in the cooperation condition.

Unfortunately, our ANOVA results did not reveal an interaction effect that we were looking for. However, our exploratory post-hoc analyses reveals an indication that social context modulates encoding of the co-actor relevant information when individuals perform a joint task in line with the predictions of self-other integration account. That is, a positive interdependence between partners (cooperation) seem to have increased the overlap between the representations of the self and the representation of the other; thereby making task co-representation more likely. Accordingly, individuals in a cooperative relationship recalled co-actor relevant information better than the information non-relevant to any party in a joint task. This effect was reversed in a competitive relationship, in which task co-representation is less likely due to low self-other integration. As a result, our participants did not show a memory advantage for co-actor relevant information over the information non-relevant to any party. This co-representation effect, according to our post-hoc analyses, was found marginal in the independent condition when individuals do not influence each other's outcome in the task; given that the degree of the self-other integration observed in the independent condition is expected to be lower than in cooperation condition but higher than in the competition condition. Similarly, post hoc analysis of the recognition data further support this pattern of results. Individuals in cooperative settings also recognized co-actor relevant information significantly better than information non-relevant to any party. In contrast, this co-representation effect was found absent in recognition performance of those in independent and competitive settings as the self-other integration between individuals is relatively lower in these settings.

The second goal of the study was to address the question of the nature of co-representation as it still remains unclear that to what extent people mentally perform the other's task when it is not their own turn, but their task-partner's turn to act. To that end, we added a second categorization task which required individuals to categorize word items based on perceptual features. This means that participants only needed to attend to the perceptual features of the stimuli in order to perform their own part of the categorization task; and once the item was categorized as self-relevant, they needed to proceed to semantic processing to encode these items for the subsequent informed recall test. In other words, categorization task alone did not require participants to semantically process words that are not relevant for them. With this modification, we aimed to understand whether individuals will attend only to the perceptual feature of the stimuli relevant to a co-actor (actor co-representation) or if they would engage in semantic processing of the co-actor relevant stimuli. The latter would indicate that they semantically process the stimulus because it is the co-actor's job to do so (task co-representation).

Our principal statistical analyses did not reveal an interaction between perceptual category and social condition. However, results of the post hoc t-tests pointed to the presence of a co-representation effect: Other relevant information was recalled better than non-relevant information. That is individuals seem to have represented their co-actors' task, which is semantic processing of their own items, and did not just stop at categorizing the words simply on the basis of their perceptual features. This is in accordance with the task co-representation account.

Surprisingly, however, we observed this co-representation effect only in the independent social condition, and not in any of the other social conditions. Based on the self-other integration account, we originally predicted that participants would show an enhanced recall performance for co-actor relevant information in the cooperation condition, as high self-other integration in the cooperation strengthens the co-representation effect. This effect would be expected to be less in the independence condition, and absent in the competition condition. However, unexpectedly, while participants in the independence condition recalled co-actor relevant information significantly better than information non-relevant to any party, this memory advantage for co-actor relevant information over non-relevant information was not observed in the cooperation condition.

At present, we do not have a clear explanation as to why the influence of our social context manipulations on a perceptual categorization task should be different than a semantic categorization task. One possible explanation is that while performing the perceptual categorization task, being in an interdependent relationship with the co-actor, due to the more complex nature of the task set, might create an additional cognitive load. This would in turn hinder co-representation for those individuals. Although there is no direct evidence in the literature showing that cognitive load obstructs task co-representation, first accounts of self-other integration (e.g. Decety & Sommerville, 2003) posit that the self-other integration mechanism relies on executive functions. That is because co-ordination of self and other's mental representations requires executive functions resources for processes such as inhibition, coordination, planning and attentional flexibility. In their study conducted with patients who have lesions in their frontal lobes, Humphreys & Bedford (2011) also suggested that the inability to recruit sufficient resources to code co-actor's actions might account for the absence of co-representation effect in those patients because the allocation of attention to the co-actor is resource demanding. In a similar vein, Milward, Kita, & Apperly (2014) showed that children younger than 4 are not able to co-represent their partner's task; suggesting that task co-representation may require advanced executive function skills. Therefore, we believe that the additional computational load imposed by the interdependent conditions in this particular task setting might prevent individuals from co-representing their partner's task.

This is also partially reflected in the RT data such that although the only significant difference is found between independence and competition conditions, there is a pattern suggesting that participants in the cooperation and competition conditions were slower in responding to their own items than those in the independence condition. In the semantic categorization task, however, there was no such a difference in individuals' response times across social conditions.

Because our stimuli disappeared once a response was given, slower RTs mean longer exposure to one's own and co-actor items in the perceptual task, and the longest (i.e. 1500ms) exposure to non-relevant items. Even though RTs were found lowest in the independent condition compared to the interdependent conditions, individuals in the independent condition were better at remembering these items than non-relevant items, to which they had the longest exposure. We believe that this superior recall performance for the items of co-actor relevant category, over the items of non-relevant category, despite of the discrepancy between categories in terms of exposure time (shorter for co-actor relevant, longer for non-relevant), could be taken as evidence for the presence of task co-representation. However, the question of why the influence of social context differs across different task settings, still remains unanswered and calls for further research.

4.2. Contributions

This study makes some pertinent contributions to both memory and joint-action literatures. First, previous studies using joint memory paradigm only examined independent settings where individuals' performance in the task does not affect each other's outcome (Eskenazi et al., 2013, Elekes et al., 2016). However, how interdependent settings affect one's encoding of the information was largely unknown even though such interdependent situations are quite prominent in our daily lives. Therefore, our findings shed light on the role of social context on one's encoding of the information in a more generalizable way by introducing interdependent settings to the paradigm and differentiating the effect of each social setting (independence, cooperation and competition in particular) on one's memory processes.

Secondly, although it is not reported, participants also performed a recognition task in the study by Eskenazi et al. (2013) to see whether co-representation effect is present in individuals' recognition performance (unpublished data). However, there was no significant difference in individuals' recognition performance for other-relevant information and information nonrelevant to any party in the joint condition. On the other hand, because interdependent goals with a co-actor makes the co-actor socially more relevant than he would be in an independent setting, we also expected an enhanced recognition performance for co-actor relevant information compared to information non-relevant to any party. Supporting the self-other integration again, our post hoc analysis showed that participants in the cooperation condition recognized co-actor relevant items better than items that no one responded; which could be explained by the higher overlap between the representations of the self and the other due to the cooperative relationship compared to previous study in which individuals are totally independent to each other in terms of goal attainment. Thus, our findings may be indicating the presence of co-representation in a different level of memory process.

Finally, and most importantly, what is actually co-represented in joint task settings is still debated in the literature (for an overview, see Obhi, & Sebanz, 2011; Wenke et al., 2011). Although our theoretical foundation has been established on task co-representation account, there are also studies suggesting that participants co-represent *that* another person is responsible for the complementary task share, and *when* the other person has to respond instead of *what* the other person is supposed to do (Philipp & Prinz, 2010; Wenke et al., 2011). In this sense, our study contributes to the task co-representation account as we modified the experimental paradigm described by Eskenazi et al. (2013) and added a perceptual feature to the stimulus for the categorization part of the task. With this modification, we were able to see whether individuals attend to the perceptual feature of the stimulus that required a co-actor to act (actor co-representation) or if they semantically processed the stimulus because it is the co-actor's job to do so (task co-representation). Perceptual task recall data showed that individuals in the independence condition were better at remembering co-actor relevant items than items non-relevant to any party, indicating deeper semantic processing of co-actor relevant information. Therefore, our study also provides partial support for task co-representation account.

4.3. Limitations

Certain limitations of the study should be noted. Although our post hoc analyses provides a support for the presence of co-representation effect on memory across different social conditions, results of our ANOVA test did not reach significance. One possible explanation for this is that as suggested by our post-test evaluation questions our social context manipulation was not sufficiently effective for each condition. This in turn might have weakened the differences in memory performance among conditions. As an alternative explanation, but not mutually exclusive, is that items remained on the screen until a response was given, or for a maximum of 1500 ms. Therefore, individuals saw items that no-one responded to for 1500 ms, while duration of items that co-actor responded was relatively shorter; which makes encoding of co-actor relevant information more difficult. This might have dampened the difference between depth of encoding for co-actor relevant items and non-relevant items. Despite this discrepancy among categories in terms of exposure time to the information, our results still provide evidence for co-representation effect in cooperation and independence conditions in line with the predictions of self-other integration account.

As another limitation, majority of the participants (76%) were female students; which might be undermining the generalizability of our findings. Additionally, most of the participants were psychology students who knew each other. Although we controlled for the level of shared history between participants, this does not rule out the possibility that some participants might have had pre-formed impressions about their partners, which would influence their perceptions of the social context.

4.4. Future Directions

We believe that the present study offers new avenues for further research at the intersection of joint action and memory fields. First, the present study focuses on social relationships where individuals are linked to each other in a purely cooperative or competitive way. However, in daily life we face more complex situations in a way that we establish cooperative relationships in order to compete with other groups. Intergroup competition has been extensively studied in particular domains such as group processes, attitudes, social identity, prejudice etc. However, surprisingly, how such a complex interdependent setting affects one's cognitive processes has been overlooked in the literature. Although our results provided evidence supporting self-other integration account for cooperative and competitive situations, this account might fall short of explaining the effect on intergroup competition on one's task representation and encoding of the information due to complex interdependent relationships among individuals. It is reasonable to expect that those in the cooperative relationship focus on their own responsibilities only to use their cognitive resources effectively as a group and closely monitor their competitor to adjust their performances; which is in line with our alternative transactive memory account. Although we presented two accounts as opposing approaches in our study as they afford contradicting predictions regarding cooperation and competition, these accounts might be rather complementary to each other to explain a bigger picture. Therefore, it might be a promising avenue to explore the effect of intergroup competition on one's task representation and encoding of the information for social cognition research.

Second, while our own errors are always associated with a loss of reward, other people's errors are associated with loss or gain depending on the cooperative or competitive context in which they are made. Accordingly, the influence of interdependent settings on error monitoring has been studied in the literature (for a review Koban & Pourtois, 2014). However, it is largely unknown how individuals encode co-actor's correct responses and errors in a joint task when they are cooperatively or competitively linked to each other. More specifically, the question of whether individuals would distinctively process and encode their partner's correct responses and errors depending on the social context (cooperation vs competition) has not been investigated in the literature. Further research should shed light on individuals' memory processes for others' actions by distinguishing the influence of each social setting to broadly understand action/error monitoring, which is vital for learning, adaptation and survival. Finally, co-representation effect is mostly studied in experimental designs which produce transient effects. On the other hand, it is largely unknown whether task co-representation causes long lasting effects on individuals' cognitive processes. We believe that joint memory paradigms could be quite suitable to investigate this question in future.

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APPENDICES

APPENDIX A – STIMULI LISTS

LIST 1		
Animals	Fruits & Vegetables	Household Items
kuş	biber	dolap
tavuk	elma	lamba
ayı	limon	saat
böcek	patates	ocak
karınca	mısır	cetvel
sinek	enginar	yorgan
fil	nane	karyola
geyik	şeftali	çekiç
inek	çilek	baza
ördek	fasulye	peçete
martı	kiraz	ampul
domuz	salatalık	tarak
öküz	bezelye	eldiven
çekirge	kereviz	bidon
leopar	dut	daktilo
zürafa	ananas	mikser
yunus	böğürtlen	abajur
kaplumbağa	yulaf	oklava
kırlangıç	turunç	paspas
sıçan	pırasa	şifonyer

LIST 2		
Animals	Fruits & Vegetables	Household Items
kedi	soğan	kaşık
yılan	üzüm	perde
deve	buğday	yastık
fare	ıspanak	fırça
keçi	havuç	kanepe
arı	fındık	tava
horoz	nar	minder
tavşan	marul	terlik
hindi	bakla	kitaplık
kartal	armut	süzgeç
çakal	kayısı	süpürge
kaz	mercimek	kepçe
akrep	lahana	tabure
timsah	kavun	rende
sincap	turp	makas
örümcek	pancar	komodin
baykuş	bamya	mandal
panter	avokado	havan
zebra	brokoli	huni
kirpi	ahududu	kürdan

LIST 3		
Animals	Fruits & Vegetables	Household Items
at	zeytin	anahtar
koyun	muz	bez
aslan	sarımsak	kupa
boğa	portakal	havlu
maymun	maydanoz	klima
karga	patlıcan	bavul
sığır	kabak	sabun
güvercin	incir	kase
balina	kekik	battaniye
serçe	nohut	sehpa
bülbül	vişne	vazo
yengeç	mandalina	ütü
leylek	erik	fincan
kurbağa	karpuz	avize
salyangoz	hurma	çakmak
tazı	greyfurt	tornavida
köstebek	pazı	ıspatula
şempanze	karnabahar	buzluk
panda	kivi	çaydanlık
kokarca	börülce	termos

APPENDIX B – VERBAL INSTRUCTIONS

Instructions Prior to the Experiment

Çalışmamızın amacı insanların bilişsel performanslarının başka insanların varlığında değişip değişmediğini gözlemlemektir. Bu yüzden bu çalışmada sizden iki farklı sınıflandırma testini bilgisayarda birlikte yapmanızı isteyeceğim.

İlk/ikinci sınıflandırma testinde ekranda hayvan, bitki ve eşya kategorilerine ait bazı kelimeler göreceksiniz. Senin görevin XXX kategorisine ait kelimeler ekranda belirdiğinde A/L tuşuna basarak cevap vermektir. Senin görevin (diğer katılımcı) ise YYY kategorisine ait kelimeler ekranda belirdiğinde A/L tuşuna basarak cevap vermektir. ZZZ kategorisine ait kelimeler ikinizden de herhangi bir cevap gerektirmemektedir.

İlk/İkinci kısımda daha görsel bir sınıflandırma testi yapacaksınız. Ekranda farklı kategorilerden bazı kelimeler belirecek. Fakat bu kelimelerin bazılarının altından düz çizgi, bazılarının altından kesik çizgi, bazılarının altından ise noktalı çizgi geçecek. Senin görevin XXX çizgili kelimeler ekranda belirdiğinde A/L tuşuna basarak cevap vermektir. Senin görevin ise YYY çizgili kelimeler ekranda belirdiğinde A/L tuşuna basarak cevap vermektir. ZZZ çizgili kelimeler ikinizden de herhangi bir cevap gerektirmemektedir.

Kelime sınıflandırma testini tamamladıktan sonra deney bir hatırlama testiyle devam edecek. Bu bölümde de sizden iki sınıflandırma testinde de cevap vermiş olduğunuz kendi kelimeleri hatırlamanızı isteyeceğim. Bu yüzden lütfen testleri bu isteğimi göz önünde bulundurarak yapınız.

Social Context Manipulation:

Cooperation: Bu deneyde bir takımmış gibi değerlendirileceksiniz yani iş birliği içerisinde olacaksınız. Bu yüzden kelime hatırlama testindeki performansınızın ortalamasını alacağım.

Bu ortalamaya göre hatırlanan kelime sayısı başına ikinize de deney sonunda küçük bir para ödülüm olacak.

Competition: Bu deneyde birbirinize karşı yarışacaksınız yani rekabet halinde olacaksınız. Bu yüzden kelime hatırlama testinde en çok kelimeyi hatırlayan kişiye hatırladığı kelime sayısı başına deney sonunda bir para ödülüm olacak.

Distraction Task Instructions:

Hatırlama testine geçmeden önce sizden 2.5 dk boyunca 200'den aşağıya doğru üçer üçer inerek olabildiğince hızlı ve doğru bir şekilde yazmanızı isteyeceğim. Eğer ihtiyaç duyarsanız eksiye de düşebilirsiniz.

Informed Recall Task Instructions:

Şimdi hatırlama testine geçebiliriz. Fakat başta sizden sadece kendi cevap vermis olduğunuz kelimeleri hatırlamanızı isteyeceğimi söylemiştim. Bu söylediğimden bağımsız olarak sizden iki testten de hatırlayabildiğiniz bütün kelimeleri yazmanızı istiyorum.

Recognition Task Instructions:

Son olarak sizden bir kelime tanıma testi yapmanızı isteyeceğim. Bu bölümde ekranda bazı kelimeler belirecek. Bu kelimelerin bir kısmı daha önce yaptığınız testlerde görmüş olduğunuz kelimeler, bir kısmı ise daha önce görmemiş olduğunuz kelimeler. Sizden gördüğünüz kelimelere B harfine basarak cevap vermenizi istiyorum. Görmediğinizi düşündüğünüz kelimeler herhangi bir cevap gerektirmemektedir.

APPENDIX C – EVALUATION QUESTIONS

Lütfen aşağıdaki sorulara dürüst cevaplar veriniz. Cevaplarınız deney sonuçlarınızı hiçbir şekilde etkilemeyecektir. Sorularımızın amacı katılımcılarımızın deneyde yer alırken neler hissettiği ve düşündüğüyle ilgili bilgi sahibi olmaktır.

1. Çalışmamızın amacının ne olduğuyla ilgili bir tahmininiz var mı? Eğer varsa lütfen kısaca açıklayınız.

2. Kendi kategoriniz haricinde deneydeki diğer kelimeleri de hatırlamak zorunda olduğunuzu düşündünüz mü? Eğer düşündüyseniz lütfen belirtiniz.

3. Bazı kelimeleri diğerlerinden daha iyi hatırladığınızı hissettiniz mi? Eğer hissettiyseniz hangi kelimeler olduğunu belirtiniz.

4. Deneydeki görevinizi yerine getirirken başka bir katılımcıyla deneyi yapıyor oluşunuz sizi farklı hissettirdi mi?

5. Sorumlu olduğunuz kategorideki kelimeleri ne kadar iyi hatırladığınızı düşünüyorsunuz? Yüzde olarak belirtiniz.

Lütfen aşağıdaki sorulara size en yakın olan cevabı veriniz. (1: kesinlikle katılmıyorum 7:kesinlikle katılıyorum)

6. Deneydeki görev dağılımını iyi anladım.

1	2	3	4	5	6	7

7. Deneydeki görev dağılımını diğer katılımcının iyi anladığını düşünüyorum.

1	2	3	4	5	6	7

8. Görev sırasında diğer katılımcının performansını takip ettim.

1	2	3	4	5	6	7

9. Diğer katılımcının sorumlu olduğu kelimelere de cevap vermem gerekiyormuş gibi hissettim.

1	2	3	4	5	6	7

10. Sorumlu olduğum kelimelere cevap verirken diğer katılımcının benim performansımı takip ettiğini hissettim.

1	2	3	4	5	6	7

11. Diğer katılımcının benim sorumlu olduğum kelimelere de cevap vermek istediğini hissettim.

1	2	3	4	5	6	7

12. Diğer katılımcının kendi sorumlu olduğu kelimeleri iyi hatırladığını düşünüyorum.

1	2	3	4	5	6	7

13. Diğer katılımcı kendi sorumlu olduğu kelimelerin yüzde ……….’ını hatırlamıştır.

14. Diğer katılımcının benim sorumlu olduğum kelimeleri iyi hatırladığını düşünüyorum.

1	2	3	4	5	6	7

15. Diğer katılımcı benim sorumlu olduğum kelimelerin yüzde ……..’ını hatırlamıştır.

16. Görev sırasında kendimi diğer katılımcıyla bir bütün gibi hissettim.

1	2	3	4	5	6	7

17. Görev sırasında diğer katılımcıyla bir takım gibi hareket ettik.

1	2	3	4	5	6	7

18. Görev boyunca diğer katılımcının varlığının farkındaydım.

1	2	3	4	5	6	7

19. Deney boyunca diğer katılımcıyla aynı şeyleri hissettiğimizi düşünüyorum.

1	2	3	4	5	6	7

20. Diğer katılımcı hakkındaki düşüncelerim genel olarak:

1	2	3	4	5	6	7

Tamamen Negatif Tamamen Pozitif

21. Diğer katılımcının benim hakkımdaki düşünceleri genel olarak:

1	2	3	4	5	6	7

Tamamen Negatif Tamamen Pozitif

22. Deneyi birlikte yaptığınız katılımcıyı deneyden önce ne kadar tanıyordunuz?

1	2	3	4	5	6	7

Hiç tanımıyorum Çok iyi tanıyorum

Eğer cevabınız "hiç tanımıyorum" dan farklı ise aşağıdaki sorulara cevap veriniz.

23. Diğer katılımcıyı kaç senedir tanıyorsunuz?

24. Diğer katılımcıyla nereden tanışıyorsunuz?

25. Diğer katılımcıyla boş zamanlarınızda birlikte vakit geçiriyor musunuz?

26. Diğer katılımcıyla olan ilişkinizi nasıl tanımlarsınız?

27. Diğer katılımcıyla ortak aldığınız dersler var mı?

28. Diğer katılımcıyla ortak arkadaşlarınız var mı?

29. Diğer katılımcının hobilerini biliyor musunuz?

Deney boyunca görevler genel olarak:

30.

1	2	3	4	5	6	7

Kolay Zor

31.

1	2	3	4	5	6	7

Keyifli Keyifsiz

32.

1	2	3	4	5	6	7

Pozitif Negatif

33.

1	2	3	4	5	6	7

İşbirliğine dayanan Rekabete dayanan

34. Doğum tarihiniz nedir? …/…/……..

35. Hangi elinizi kullanıyorsunuz? Sağ /Sol