

Spring 2018

Everyday Ghosts: An Examination of Memory in Social Interactions

Sean P. Murphy
Bard College

Follow this and additional works at: https://digitalcommons.bard.edu/senproj_s2018

 Part of the [Cognitive Psychology Commons](#)



This work is licensed under a [Creative Commons Attribution-NonCommercial-No Derivative Works 4.0 License](#).

Recommended Citation

Murphy, Sean P., "Everyday Ghosts: An Examination of Memory in Social Interactions" (2018). *Senior Projects Spring 2018*. 243.

https://digitalcommons.bard.edu/senproj_s2018/243

This Open Access work is protected by copyright and/or related rights. It has been provided to you by Bard College's Stevenson Library with permission from the rights-holder(s). You are free to use this work in any way that is permitted by the copyright and related rights. For other uses you need to obtain permission from the rights-holder(s) directly, unless additional rights are indicated by a Creative Commons license in the record and/or on the work itself. For more information, please contact digitalcommons@bard.edu.

Running Head: EVERYDAY GHOSTS

Everyday Ghosts:
An Examination of Memory in Social Interactions

Senior Project submitted to
The Division of Science, Mathematics, and Computing
of Bard College

by

Sean Murphy

Annandale-on-Hudson, New York

May 2018

EVERYDAY GHOSTS

EVERYDAY GHOSTS

Dedicated to Sarah Murphy, Patricia Carson Murphy, and Kevin Murphy.

*Thank you for your patient frustrations, your generous sacrifices, and your helpful scoldings. I
love you.*

*Special thanks is made to Justin Hulbert, without whose experience, counsel, and love of cats I
would not have been capable of completing this work.*

EVERYDAY GHOSTS

Contents

Abstract	1
Introduction	2
Methods	16
Results	20
Discussion	22
References	29
Appendices	33

Abstract

Naturally occurring instances of memory suppression seem to be ones in which conflict arises between a memory and present motivations. For example, being reminded of an embarrassing past event may introduce feelings that are not desired or appropriate if you are hosting company. The emotions connected to the negative memory and the desired emotions expected of a host are in conflict, and so the memory in question may be suppressed to preserve your desire to be a congenial host. While research has served to characterize various aspects of suppression, the methodologies used by such studies rely on explicit instruction from the experimenter. To bring the study of suppression closer to how it occurs naturally, this research seeks to minimize instruction and induce suppression through instances of conflict. Participants learned a series of Name-Word pairs (e.g. MARTHA--WATCH) and imagined a distinct person attached to each Name. Audio recordings that corresponded to each person were listened to, providing a positive or negative association to each Name/person. Participants then imagined working on an important task with a subset of these individuals, repeatedly. This was followed by a surprise memory test of the Name-Word pairs. It was hypothesized that working with a person with a negatively associated Name would encourage suppression. Evidence of suppression would be indicated by reduced memory performance on the surprise memory test. There was no significant difference between the recall of positively or negatively associated Name-Word pairs. Still, reports from participants will inform the continued development of a method for the study of suppression as a result of conflict.

Introduction

It is no secret that memory is fallible. Each day presents new opportunities to catch ourselves having forgotten something--a certain strategy for a problem, a detail for some future event, or the key to the house serve as just a few examples. In many ways, these forgotten memories are like ghosts. Ghosts can represent the frightening and grotesque, but in many contexts represent things lost or forgotten. Like ghosts, forgotten memories sometimes resurface, offering a reminder of how transient memory can be. When they do, many times it is a fortunate reunion; other times, though, the forgotten memory has nothing pleasant to offer us. In many ways suppression is a process of laying to rest memories which one would prefer to avoid. While some forgotten memories, like those which may be involved in trauma, present ghosts which are too unnerving (complex) for current research methods to engage directly, this work merely seeks to engage ghosts produced by more casual instances of suppression. By analyzing these "everyday" ghosts, it is hoped that the new methodologies which result help to progress understandings of suppression to a point where the question of traumatic memory suppression may be more easily engaged.

While the mind is able to forget a staggering variety of memories, there appear to be a limited set of ways in which it goes about forgetting them. Interference of memory processes, motivated forgetting of memories, and decay of memory over time each present an aspect of forgetting, though the role of decay is arguable (Waugh, Norman, 1965). This work looks at motivated suppression, the process of intentionally forgetting memories. Specific motivations involved in naturally occurring acts of suppression are still not necessarily clear, though. Based on subjective understanding it is possible to suggest a variety of situations in which motivated forgetting might be engaged. Take for example the prospect of forgiving a person who has done something very upsetting, but maintaining the relationship you share with this person is extremely important to you, such as in the case of a friend or romantic partner. Evidence shows that individual differences in forgiveness correlate with individuals' capacity to engage

EVERYDAY GHOSTS

inhibitory control (Wilkowski, 2010). Inhibitory control describes the act or process of negating impulses or immediate associations, not just in the context of memory, but also with such desires as wanting to eat a marshmallow (Mischel, Shoda, Rodriguez 1989). Further, inhibition of memory may play a significant role in overcoming rumination of past transgressions (Pronk, Karremans, Overbeek, Vermulst, Wigboldus, 2010).

Forgiving an act that is viewed as personally repugnant might understandably require inhibitory control over emotion in addition to memory, particularly when the two are interconnected. Memory is often enhanced by emotional associations, whether those associations are positive or negative in nature, serving to improve recall of items and events that have emotional associations as compared to recall of memory for neutral associations (Kensinger & Schacter, 2008). Naturally, the emotions associated with being reminded of this repugnant act (anger, sadness, shame) would not be helpful in the process of forgiving this person. The process of forgiveness here involves not merely administering an external verbalization of forgiveness, but truly coming to forgive and make peace with what they had done. In order to prevent conflict from arising between the emotional content related to the memory and the objective of forgiveness, it makes sense why inhibitory control processes would be recruited. By interfering with memory retrieval, the recall of the negatively associated memory into awareness would be prevented. Especially in the case of powerful negative emotions, though, it becomes unclear to what extent an individual can suppress emotional memories and whether the process for emotional memory suppression differs at all from the process of suppressing non-emotionally affiliated memories. Whether suppression of traumatic memories is truly possible is still a persevering question in the field of cognitive neuroscience (Streb, Mecklinger, Anderson, Lass-Hennemann, Michael, 2016). Though this present research will not engage directly with this question, it follows in the trajectory of many past studies in developing a broader understanding of suppression, hopefully leading to a clearer understanding of suppression as applied in cases of trauma.

EVERYDAY GHOSTS

In this work the term suppression does not distinguish between states of consciousness, unlike past work in psychoanalytic theory has done by treating repression and suppression as separate processes (Erdelyi, 2006). Sigmund Freud's account in his article, "Repression," nicely describes the process of suppression as referred to in this work; "*the function of rejecting and keeping something out of consciousness*" (Erdelyi, 2006, p. 500). Still, this definition provides little insight into how this process of rejection is accomplished, the contexts in which suppression induced forgetting takes place, and what kinds of memories are or are not capable of being suppressed. Similarly, despite all that psychoanalysis has done to publicize the question of suppression in trauma, no testable claims or insights were produced. Dream analysis and psychoanalytic therapy became deeply involved in this question, but relied almost exclusively on the subjective perspective of the patient and the interpretations of the psychoanalyst. While many aspects of psychoanalytic theory hold merit, ultimately it proves incapable of supporting a stance on these topics through empirical, falsifiable research. Since the mid-20th century, new methods of studying suppression have emerged.

Think/No-Think paradigm

One method of studying suppression is the Think/No-Think (TNT) paradigm (Anderson & Green, 2001). Based on the Go/No-Go task, a method of studying control over motor reactions, the TNT paradigm addresses control over memory retrieval. In the original paradigm, a participant first learns a series of word pairs, for example ORDEAL--ROACH. While the original method used pairs of words, subsequent iterations of the TNT paradigm have successfully substituted pictures for one or even both words in a pair. After studying these items, the participant is then tested to make sure they have learned these pairs to a certain level of success, a criterion. The participant must reach the criterion for success before proceeding in order to ensure that they have developed an equivocal degree of memorization and familiarity with the pairs. This also helps to create something of a standard memory across all participants.

EVERYDAY GHOSTS

Following this learning phase, the participant is prepared for the main phase of the paradigm through a short period of practice. When prompted with the cue (the left word in a given word pair) the participant is instructed either to *think* about the correct response to this cue, or for other cues to *not think* about the response, and in fact to completely avoid thinking about anything other than the cue-word. This repeated process of either thinking or not-thinking about the response to a cue is what prompts the name for this paradigm. Importantly, the participant is not told that this manipulation is based around memory, but rather told that this ability to accept or push away the thought of the response functions on the basis of attention. This is done so as to avoid any expectation from the participant of a memory test at the end, a suspicion which may influence their behavior in the study and have a resultant impact on the results of the Think/No-Think manipulation. After first practicing this task of retrieving or suppressing the response word in a given pair, the participant then engages in the main phase of the paradigm. In this phase a portion of the cues from the total series of word-pairs is presented (both think and no-think cues). The series of cues is repeated, sometimes upwards of twelve times before the phase is concluded.

Having completed these repetitions, there is a final phase comprised of a surprise memory test for all of the studied pairs. The participant attempts to verbalize the correct response word to each cue-word that is presented, regardless of whether they were meant to think or not-think about the response during the main phase of the experiment. As demonstrated in Anderson and Green's findings, the results of this final test show significant improvement in memory performance for Think (T) items compared to baseline (B) items, items which were learned along with the rest of the associations but were not cued at all during the main Think/No-Think phase. Memory performance for No-Think (NT) items is significantly impaired compared to performance for baseline items. The general layout of the TNT paradigm (figure 1) and the general results of the TNT paradigm (figure 2) are shown below.

Phases of the standard TNT paradigm






<p>1) Learning Phase</p>	<p>Presented the items to study</p>	
<p>2) Test-to-Criterion</p>	<p>Confirm set standard of learning</p>	
<p>3) Practice Phase</p>	<p>Learn tasks for main TNT phase</p>	
<p>4) TNT Phase</p>	<p>Think or Not-Think, repeatedly</p>	
<p>5) Final Phase</p>	<p>Surprise! A memory test</p>	

Figure 1

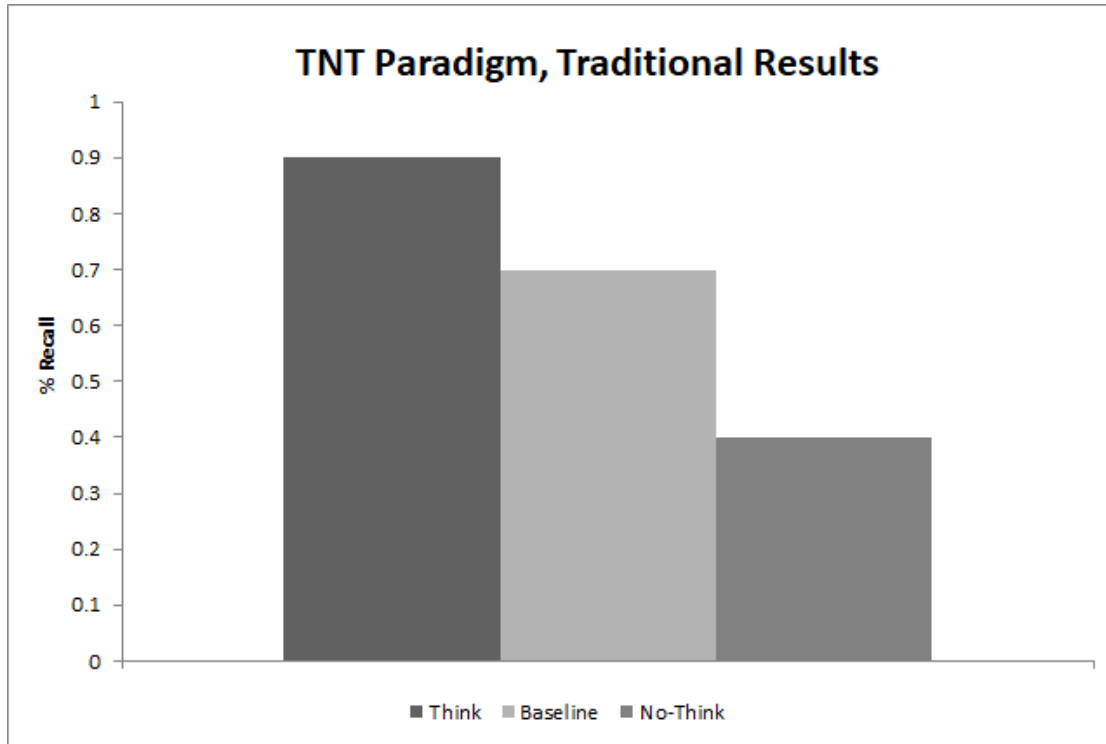


Figure 2

Cognitive control and motivated forgetting

Inhibitory control over memory appears to be an exercise of cognitive control. Cognitive control describes a range of regulatory processes directed from executive regions of the brain to regions involved in lower-level processing of stimuli. The dorsolateral prefrontal cortex (DLPFC), affiliated with cognitive control, experiences significant activation during instances of suppression as shown in fMRI imaging studies (Anderson et al., 2004; Anderson & Hanslmayr, 2014). This activation of the DLPFC is not present in instances of memory retrieval, only suppression, and not merely the suppression of pre-formed memories, but also prospective thoughts of potential future events (Benoit, Davies, Anderson, 2016). The hippocampus, a brain region associated with memory consolidation and encoding, experiences a corresponding deactivation during instances of suppression. This suggests that the DLPFC exerts a modulating effect over the hippocampus, resulting in the observed inhibition of memory upon later retrieval. Memory is not erased as a result of suppression, but is instead reversibly impaired. Still, while memory is not permanently hampered by interrupting retrieval via suppression,

EVERYDAY GHOSTS

deactivation of the hippocampus which results from this control suggests a capacity for suppression to hamper recall of memories in the long term (Hulbert, Henson, Anderson, 2016).

The TNT paradigm is only one means of studying memory inhibition. The directed forgetting (DF) paradigm involves the motivated inhibition of certain items over others. While there are many varieties of the DF paradigm, one general method is list-method directed forgetting (LMDF). In this paradigm participants are informed that they must study the materials they are presented in preparation for a final memory test, but that there will be some items that will not be tested. Two lists of items (often word pairs) are presented to the participant, and after each list the participant is informed of whether they must remember the material in the list or whether they can forget the material. On the final memory test, despite what participants had been told, they are asked to recall all of the associated responses from both lists they were presented with. Interestingly, when list 1 (the first list) is followed by a cue to forget, memory performance for list 2 (the second list) becomes enhanced compared to memory performance in the case that neither of the lists were to be remembered (MacLeod, 1998).

This effect, termed list-2 enhancement, until recently had been considered a result of decreased proactive interference. Proactive interference describes the effect of previously learned information impairing the recall of newer information, and this may be true for the effect of list 2 on list 1 when both are cued to be remembered. A new explanation for list-2 enhancement is on the basis of context-change, in which the context of list-1 relative to the test is no longer the same as before (Hupbach, Weinberg, Shiebler, 2018; though for a contrary opinion see Abel, Bäuml, 2017). As might be gathered from this contested view of directed forgetting, it is not clear that the inhibitory processes involved in DF (if there are any) are the same as those involved in suppression-induced forgetting (SIF) in the TNT paradigm. Compared to the TNT paradigm, in which the participant first learns paired items to criterion before engaging in directed suppression, participants in the DF paradigm engage with cues to forget or

EVERYDAY GHOSTS

remember *during* the learning process. Assuming that inhibition is at least partly responsible for the memory impairment observed in DF, then the memory inhibition shown in the DF paradigm displays the impact of inhibition at the level of memory encoding whereas the TNT paradigm shows the impact of inhibition at the level of memory retrieval (Bäumel, Pastötter, & Hanslmayr, 2010). Further distinction between the processes of directed forgetting and suppression-induced forgetting is presented in the imaging data from fMRI studies, in which increased activity was observed in the medial frontal gyrus, the right middle frontal cortex, and posterior parietal cortex for directed forgetting and in the right dLPFC for TNT suppression events (Wylie, Foxe, Taylor, 2008; Bastin et al., 2012).

Emphasizing the differences between these paradigms helps to showcase the utility of the TNT paradigm in examining the types of forgetting which interests this present research. To describe naturalistic suppression as it is referred to in this work, consider a scenario in which a person possesses an existing memory, is motivated to avoid thinking about that memory, but is presented with a reminder of that memory. In order to prevent the memory from coming to mind, the process of retrieving the memory--sponsored by the reminder--must be interrupted in some way so that the memory is not brought into awareness. This basic understanding of naturally occurring suppression aligns with the method utilized in the TNT paradigm, in which a reminder of an established memory is presented and the participant actively pushes the memory out of awareness. The key difference between the two is the basis of the motivation. In the case of naturally occurring suppression, motivations are multiple and complex. In the example provided earlier, forgiving someone for a repugnant offense, the person trying to forgive may be motivated to suppress memories of the offense for a variety of reasons. They may wish to maintain a state of calm when engaging with the person who offended them, or wish to prevent doubts of their own desire to forgive this person from arising. Irrespective of the specific motivations involved, though, it is the resultant conflict, between 1) the emotional state or biased thinking that may be brought on with remembering the offense and 2) the mental and

EVERYDAY GHOSTS

emotional state desired by the individual, which sponsors the use of suppression to inhibit memory retrieval.

Thought-substitution and direct suppression

Given that instances of naturalistic suppression have not been studied directly, it is not yet possible to distinguish what type of approach is usually taken when suppressing memories in a given context. Work with the TNT paradigm has characterized two distinct approaches, one being thought-substitution and the other being direct suppression. In the case of thought-substitution the participant, when prompted with an item they are meant to suppress, will replace the original response to the cue with a new image, thought, or sound (such as replacing ROACH in the pair ORDEAL--ROACH with the thought of a flower). Alternatively, when participants engage in direct suppression they push away any other thought or association, only focusing on the cue that has been provided (ROACH). Behavioral studies have found comparable results of each method, noting comparable inhibition of memory for word pairs in the surprise memory test (van Schie, Geraerts, Anderson, 2013). However, fMRI imaging has characterized differences in which regions of the prefrontal cortex are active in each approach. While activation of the dLPFC is noted in the case of direct suppression, thought-substitution correlated with the activation of mid-ventromedial PFC and the left caudal PFC (Benoit & Anderson, 2012). Further, deactivation of the hippocampus was not observed in the case of thought-substitution, lending to the interpretation that thought-substitution, rather than interrupting the retrieval process, inhibits recall of the original response by means of introducing competition between the original and newly associated items. To what degree one or both of these approaches occurs in natural instances of suppression remains unexplored, and this present research hopes to progress research closer to answering this question.

The first step in achieving this distinction is in developing a method of assessing suppression in a more naturalistic way. Comparing the TNT paradigm to how natural instances of suppression are perceived, the largest inconsistency is in the explicit instructions inherent to

EVERYDAY GHOSTS

the TNT paradigm. The instructions provided to participants to “push away the associated response” when they see a certain color, while helpful in producing a reliable means of promoting suppression, do not reflect the motivations involved in a real-world instance of suppression. Therefore, removing these explicit instructions will be a necessary step in the development of a new method. Still, the participant must be given some direction, some motivation, in order to enact the suppressive behavior that is to be researched. Studies of another form of motivated forgetting suggest a means of achieving this through the medium of social engagement.

RIF and SSRIF

Retrieval induced forgetting (RIF) describes a selective-retrieval process, different from the inhibitory modes of forgetting which have been discussed until this point. In RIF studies, participants learn a series of items, groups of which are related within a semantic category (e.g. FRUIT includes the items ORANGE, APPLE, PINEAPPLE, and CHERRY). Participants then rehearse only a portion of the items from a given category (e.g. only ORANGE and APPLE). The results of a final memory test of all items show impaired memory performance for items which were not rehearsed, but an even greater impairment for those items which were not rehearsed and which shared a semantic category with words which were rehearsed (Anderson, Bjork, Bjork 1994). Selective rehearsal, in this way, creates an imbalanced competition between items of a given category leading to impaired memory performance for those items which fail to compete. While this type of motivated forgetting does not relate directly to the focus of this present work, suppression induced forgetting, subsequent research into RIF within social interactions and with autobiographical memories provide inspiration for how a method of studying naturally occurring suppression might be developed.

Socially-shared retrieval induced forgetting (SSRIF) describes how RIF can occur in social interactions, not merely for the speaker who recalls the information being discussed, but also for the listener in the exchange. In these experiments, RIF was observed using scripted and

EVERYDAY GHOSTS

unscripted narratives, even when two participants freely converse on the topic to one another. The same was observed even in subjective autobiographical memories of a common event and even when that event was of a significant emotional nature, that of September 11th, 2001 (Cuc, Koppel, Hirst, 2007; Coman, Manier, Hirst, 2009). Though the process of forgetting in these examples is very distinct from the suppression induced forgetting pursued by this current research, these works still emphasize the capacity to engage in motivated forgetting even in situations as everyday as a conversation.

TNT and emotion

Emotional motivations, as discussed earlier in this introduction, are likely one of the major determinants of suppressive behavior. Research into the suppression of emotionally associated memories via the TNT paradigm has presented conflicting results. Some accounts suggest that items which possess emotional valence (significance) experience an increased deficit in memory performance compared to neutral stimuli (Banich et al., 2009) though others merely find that emotional materials are equally affected by motivated suppression as neutral items (Depue, Curran, Banich, 2007; van Schie, Geraerts, Anderson 2013). Still other accounts suggest that emotionally valent stimuli, particularly those of negative valence, are more difficult to suppress than are neutral stimuli (Nørby, Lange, Larsen, 2010). This relates to the level of activation inherent to a given stimuli and its subsequent influence on the success or failure of inhibitory control exerted upon it (Detre, Natarajan, Gershman, Norman, 2013). Similar conflicts have persisted in other motivated forgetting paradigms, including RIF (Dehli & Brennen, 2009; Kuhbandner, Bäuml, Stiedl, 2009). These differences may be attributed to differences in valence across stimuli sets used in each experiment. Possible differences may have also arisen between studies which did or did not specify between direct suppression and thought substitution. Additionally, these differences may also reflect individual ability to engage and suppress stimuli of a negative valence, suggesting a possible resistance to suppression for items of negative emotional valence. These findings relate to the assertions of Roy Baumeister who

EVERYDAY GHOSTS

emphasized the potency of negative information and experiences over positive ones (Baumeister, Bratslavsky, Finkenaur, Vohs, 2001).

One recent fMRI imaging study has observed suppression of negative emotionally valent stimuli and even found evidence that the reduced activation of the hippocampus and amygdala were not merely coincidental, but were in fact both targeted by a top-down inhibitory mechanism which originated in the dlPFC, suggesting a concerted mechanism of control over emotional memory (Gagnepain, Hulbert, Anderson, 2017). Given such findings alongside those of the studies mentioned previously, it seems apparent that negative information certainly can be suppressed via direct suppression. Even so, individual differences in cognitive control may play a key role in determining successful suppression of negative stimuli. In fact, individual differences in inhibitory control are observed even for neutral stimuli (Levy & Anderson, 2008; Küpper, Benoit, Dalgleish, Anderson, 2014).

Individual differences and the ironic processes model

In their study of the effects of suppression over long periods of time, Noreen and MacLeod (2014) also refer to individual differences in ability to suppress, though in their study it was the suppression of autobiographical memories. Interestingly, those participants who reported the most difficulty in achieving suppression in the TNT paradigm at the first session of the study experienced a rebound in recall during subsequent sessions (3-4 or 12-13 months later)--they expressed an enhanced recall of the material previously targeted for suppression. This unexpected result, as they note, recalls earlier work with the ironic process theory (Wegner, Schneider, Carter, White, 1987). A portion of participants were instructed to avoid thoughts of a white bear for a duration of 5 minutes, during which they were to verbalize as part of a stream of consciousness exercise and/or ring a bell when they happened to think of a white bear. This was followed by a 5 minute period in which participants were encouraged to think of a white bear. Strangely, those participants who were first tasked to avoid thinking about a white bear, to suppress it, expressed more frequent thoughts about a white bear on the subsequent expression

EVERYDAY GHOSTS

task than those who had not suppressed the thought before. This would seem contrary to the findings of the many studies of suppression reviewed so far, in which persistent memory deficits result from suppressive behavior.

Importantly, the differences between the methods used in these white bear experiments and those utilized in other motivated forgetting paradigms likely explain the very different results. Notably, whereas in the TNT paradigm participants are only engaging and suppressing a memory for a few seconds at a time, participants in ironic process studies attempt to maintain total suppression of a thought for five minutes (comparatively, a very long time). In addition to the length of this task, it must be observed that the participants of the ironic process study do not have the luxury of a cue to respond to, but rather must be constantly watchful for the thought of the white bear. The cue presented in the TNT paradigm can be considered a luxury in that the participant must only respond to it and concern themselves with the task of suppression when the cue is presented. In contrast, the participant in the ironic process study must keep the thought of the white bear continuously primed so that they may maintain a self-monitoring process so that they can report upon any bear-related thoughts in the moment. In addition to these considerations of methodology, Noreen and MacLeod (2014) point out the possibility that ironic rebound in subsequent memory may be partly explained by individual differences in the ability to suppress.

Considering this emphasis on individual differences, subjective experience also shows how individuals differ in their capacity to forgive. Remembering back to that first example of forgiving a repugnant offense, it seems clear that certain people have a greater capacity to forgive some things than others, meaning that the capability to suppress retrieval in response to a reminder of the offense might differ on the basis of the individual's capacity to forgive. When tasked with engaging with reminders of theoretical scenarios that they had previously decided either to forgive or not to forgive, participants were more successful in suppressing memories of scenarios they had forgiven rather than those they felt they could not forgive (Noreen, Bierman,

EVERYDAY GHOSTS

MacLeod, 2014). Additional variants of the TNT paradigm show that there are many aspects of individual difference which may affect ability to suppress. Individuals' capacity to engage with and manage stressful problems in different ways, sometimes described as individual coping style, has also been shown to influence the ability to suppress. Repressive copers have demonstrated an increased capacity to suppress negatively associated material than individuals who rank lower in repressive coping (Hertel & McDaniel, 2010; LeMoult, Hertel, Joorman, 2010). Additional differences in performance are observed in those who ruminate often, meaning those who dwell upon memories for a significant amount of time, such as individuals suffering from depression (Hertel, Maydon, Ogilvie, Mor, Under Peer-Review). Considering these differences between individuals will be necessary not only in this first step of creating a method for the study of naturalistic suppression, but will be essential as stimuli are chosen and developed to test the bounds of motivation for suppression.

Present Design

In this current study a new variant of the TNT paradigm will be tested to progress research of suppression toward a better model of suppression as it happens in the real world. The explicit instructions relied upon in the basic form of the TNT paradigm will be removed and replaced with a task that promotes suppression through scenarios that would model instances in which suppression might occur in the real world. Understandably individuals utilizing suppression in day-to-day life are not waiting for a color cue to indicate that it is time to push away thoughts of a memory. For that matter, the way in which the Think and No-Think tasks are worded to participants may itself impinge upon how suppression would naturally occur. By encouraging participants to engage in suppressive behavior that closely follows only one pattern, it is possible that there are minor aspects of suppression that are not being observed.

To provide participants with implicit motivation to suppress presented material, this variation of the TNT paradigm, instead of utilizing instances of Think and No-Think, utilizes instances of Conflict and No-Conflict (CNC). By changing the context of the Think/No-Think

EVERYDAY GHOSTS

task to focus on social interactions under stressful or high-stakes situations, it is hypothesized that situations in which negatively associated characters are introduced will present a greater degree of conflict for participants. It is further hypothesized that social interactions which present conflict will provide motivation to suppress information that enables this conflict to perpetuate. While it would be ideal to conduct a study in which this CNC variant were tested alongside a more traditional version of the TNT paradigm using the same social stimuli set, this present study will only be looking at the CNC variant of the paradigm. Considering the variety of individual difference that has been observed in the ability to suppress, this study will also assess participants' coping style in order to assess whether ability to suppress these test materials differ according to differences in coping. Based on previous work with repressive copers, this work hypothesizes an increased capacity for suppression of negative material based on repressive (cognitive avoidant) coping style.

Methods

Participants

Preliminary Survey

170 members of the Bard College community participated in an online survey of coping style, advertised as a survey of reaction patterns in response to stress using both printed and digital advertisements. Participants at this point were not screened according to age, given the desire to capture a large sample of prevailing coping styles in the community. Participant data was kept anonymous by a randomly assigned subject number which, if requested by the participant, was kept separately from their contact information. Of these 170 participants, 60 were excluded from Raffle 1 as they did not complete the survey and 5 who did not submit contact information for the raffle.

Main Study

29 students (15 female, 13 male, 1 non-binary) between the ages of 18 and 25 ($M = 21$ years old) recruited from Bard College were sent follow-up emails based on their interest in

EVERYDAY GHOSTS

future participation as they had indicated on the preliminary survey of coping styles. Participant data was kept anonymous was kept anonymous by a coded subject number.

Procedure

Preliminary Survey

After navigating to the advertised internet platform used to administer the survey to participants (SurveyGizmo.com), participants provided informed consent before proceeding to the survey questions. The online survey of coping mechanisms was composed of 48 statements which participants rated based on how accurately the statement described how they act in a stressful situation. These statements were adapted from the Coping Response Inventory (CRI) which assesses coping along two dimensions, approach and cognitive avoidance (Moos, 2004; Moos, 1995; for related work see Krohne et al., 2000). Each statement corresponds to either an approach coping style or a cognitive avoidant coping style (associated with repressive coping). The survey took approximately 10 minutes to complete. Coping style was determined based on the difference between the sum of the ratings for approach statements and the sum of the ratings for cognitive avoidance statements. Out of the 110 participants who completed the survey, 57 were of an approach coping style, 42 of a neutral style (meaning that the difference between the sums did not exceed 100 in either direction from a flat difference of 0), and 11 cognitive avoidant copers. Participants were debriefed following completion of the survey.

Main Study

Structured very much like the original TNT paradigm, the main study was comprised of an initial learning phase, a test-feedback phase, a narrative phase, the main TNT phase, and the final test phase. In the learning phase, participants were exposed to 36 novel Name-Word pairs standardized in-lab (e.g. CHARLOTTE--STATUE; see Appendix B for the full set of Name-Word pairs) which they were presented visually on a computer screen twice, each pair for 5 seconds each time. While learning these pairs, participants were also instructed to develop a notion of a

EVERYDAY GHOSTS

distinct person who corresponded to the Name in the Name-Word pair, but importantly one that was distinct from personal experience. After the second round of presentation of the Name-Word pairs, participants entered a test-feedback phase in which they were presented only the Name from the Name-Word pairs alone on computer screen. When presented with a given Name, the participant was asked to speak aloud the correct Word that was paired with it. After the 4 seconds provided, regardless of whether the response was correct or incorrect the correct Word response was briefly displayed on the screen. Once the Word response had been recalled for a given Name, that pair was removed from rehearsal. Pairs which had incorrect responses were presented again in successive randomized presentations until each received a correct Word response. Criterion was reached when participants had successfully recalled the Word for each of the Names one time.

In the narrative phase that followed, participants listened to audio recordings of a positive or negative valence (randomized for each participant). These recordings were presented as phone messages addressed to the participant from the person whose Name was presented on the screen while the audio recording played. The positive and negative narratives for each Name-Word pair were developed using Affective norms for English words (ANEW) inventory (Bradley & Lang, 1999) can be found in Appendix B.

In preparation for the main TNT phase, the participants were tasked with imagining an extremely important assignment, such as studying for an exam which, if they perform at less than their best, may mean they can no longer attend college and earn their degree. The specifics of each task and what kind of interaction would be held with the person was a matter decided by the participant. This liberty within the imagination task was incorporated in the design to afford participants the chance to engage with the imagined persons on their own terms. In the example of studying for an important exam, then the person whose Name is presented might be imagined as a tutor in the subject that the exam is written for, though the opportunity to imagine a different role in this situation is always afforded. This imagination task was completed over the

EVERYDAY GHOSTS

course of 4 seconds while the Name was presented on the screen, informing the participant of which person they would be working with. After each imagination task, the participant provides a rating of how clearly they could imagine the scenario with this person and how difficult it is to interact with them. 16 Names are engaged in these imagination tasks out of the total 32 critical items (4 of the 36 being practice items). Participants would repeat this process with the 16 Names 12 times, the Names being randomized for each repetition.

Recalling the work with ego depletion, which describes how individuals may only have a limited capacity to engage with tasks requiring high control (Baumeister, Bratslavsky, Muraven, Tice, 1998), participants were provided a short break period after each repetition during the main TNT phase of the experiment. Since each imagination task is meant to involve a scenario of stressful importance, these breaks (up to 30 seconds) also help reduce the risk of fatigue in the participants.

The final phase consists of a surprise memory test of all 36 pairs, the Name being displayed visually on the computer screen for 3 seconds during which time the participant is instructed to respond with the Word response associated with that Name. These responses were recorded manually by the experimenter. Following this final, test participants completed a demographic form (Appendix C) and post-experimental questionnaire (Appendix D) and were debriefed on the nature of the main study as well as the preliminary survey they had taken. For a full overview of the instructions provided to participants, see the experimenter script in Appendix E.

Analyses

It is important to note that unlike in previous versions of the TNT paradigm in which there were three conditions for stimuli, in this CNC variant there are 4 conditions. Items are randomized into the positive cued (P) condition, baseline positive (BP) condition, negative cued (N) condition, and baseline negative (BN) condition. To compare the effect of each condition on performance relative to one another, three paired samples t-tests were conducted between items

EVERYDAY GHOSTS

in P and BP, items in N and BN, and items in P and N. To assess the effect of condition (cued or baseline) and valence (positive or negative) upon overall performance on the surprise memory test, a within-subjects 2(condition) x 2(valence) repeated measures ANOVA was conducted. To compare the effects of coping style on memory performance, a one-way ANOVA would have been conducted.

Results

Of the 29 participants, post-experimental diagnostics revealed 4 were non-native English speakers, and an additional 5 had a history of neurological and/or learning disorders (e.g. anxiety, depression, ADD, multiple concussions), or a history of such in their family. Of these participants, only one had data that qualified as an outlier. This participant's data is excluded from the following analyses which are conducted for the remaining 28 (not excluding the participants with potential exclusion criteria). Additional tests were run without the data of these 9 participants which met criterion for exclusion, as well as 4 participants who indicated they had engaged in memory-enhancing techniques in preparation for a suspected test of memory later in the study. Given the nature of this experiment as an exploratory assessment of this new design, these data are included in graphs and analyses except where otherwise noted.

There was a main effect of practice across both positive cued pairs ($M= 0.80$, $SD= 0.14$) and positive baseline pairs ($M= 0.69$, $SD= 0.20$), $t(28) = 2.77$, $p = 0.01$, $d= 0.52$, as well as negative cued pairs ($M= 0.76$, $SD= 0.19$) and negative baseline pairs ($M= 0.66$, $SD= 0.22$), $t(28) = 2.57$, $p = 0.02$, $d= 0.48$. However, there was no significant difference between positive and negative cued pairs; $t(28) = 1.53$, $p = 0.14$. Figure 3 displays the differences between the hypothesized results and those observed. When excluding data for individuals who had engaged in cheating behavior, non-native English speakers, and complicating mental conditions, the main effect of practice only persisted in the case of negative cued pairs ($M= 0.80$, $SD= 0.17$), and negative baseline pairs ($M= 0.65$, $SD= 0.22$); $t(15) = 3.42$, $p = 0.004$, $d= 0.85$.

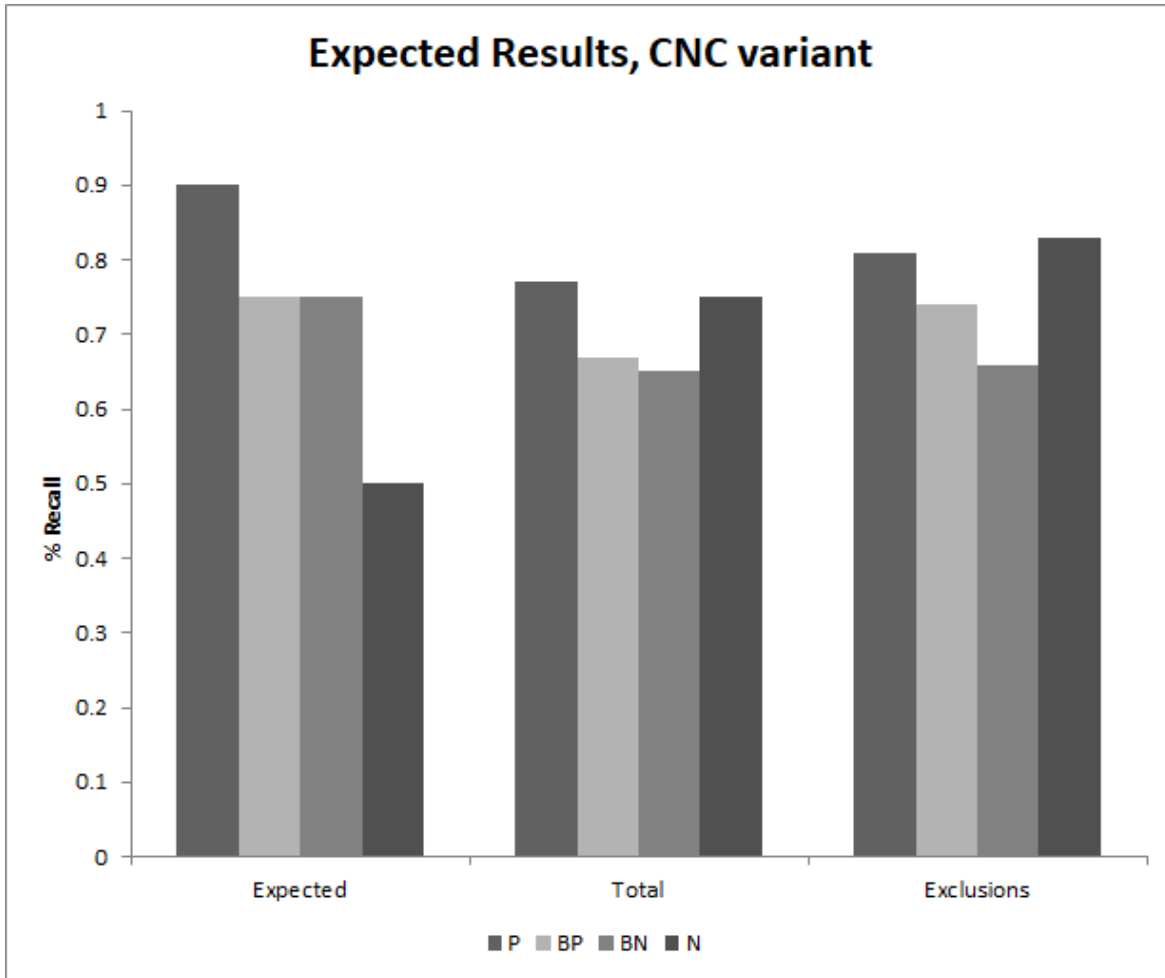


Figure 3

Although there was no observed effect of condition, memory performance within subjects was influenced by valence, Wilks' Lambda= 0.89, $F(1,27)= 3.46$, $p= 0.07$. This was observed even when excluding data for individuals who had engaged in cheating, non-native English speakers, and complicating mental conditions, Wilks' Lambda= 0.81, $F(1,27)= 3.46$, $p= 0.08$. Post-hoc analyses reveal that

Memory performance for each Name was tracked across participants and condition. Figure 4, provided in Appendix A given its size, characterizes differences in memory performance for each name, plotting the incidence of correct responses according to stimuli condition (P, BP, N, BN).

Of the 29 participants of the main study, 14 possessed an approach coping style, 11 a neutral coping style, and only 4 a cognitive avoidant coping style. The differences in size across

EVERYDAY GHOSTS

these groups does not allow for a meaningful comparison in performance across them. Still, trends in memory performance across approach and neutral copers do not suggest a significant difference across these two groups.

Discussion

Valence, condition, and conflict

This study sought to test the capacity to engage suppressive behavior by manipulating conflict in imagined social interactions. As observed in the comparison in Figure 3, memory performance on the final test did not reflect the predictions of the hypothesis. In the original TNT paradigm, performance on No-Think items was significantly impaired as compared to performance on baseline items. In this study it was expected that negative cued (N) items would present a similarly impaired performance when compared to negative baseline (BN) items. Instead, memory performance was most impaired for BN items and BP items as compared to both N items and positive cued (P) items. This difference relates an improvement in memory performance due to the additional practice for cued items during the main TNT phase which baseline items did not receive. The difference between cued and baseline was larger for positive than negative items, suggesting a potential interaction across condition. The results of the 2(condition) x 2 (valence) repeated measures ANOVA, while only marginally significant, provide evidence of a main effect of condition which is consistent with the findings from the t-tests. Post-hoc analyses confirmed that this was the result of improved performance for cued items as compared to baseline items.

These results, coupled with responses to the post-experimental questionnaire, suggest that conflict was not achieved through the manipulation of negative associations being introduced to a stressful situation. This does not mean that conflict does not promote suppressive behavior, nor that conflict that would promote suppressive behavior is not achievable through manipulation of negative association. These findings merely establish that

EVERYDAY GHOSTS

this method was not successful in achieving conflict, at least not consistently, through the use of negative associations.

Performance across Name-Word pairs

Based on the results from the post-experimental questionnaire, participants found the most challenging aspect of the imagination task how little time they had to engage with the stimuli. This issue compounds with the difficulty participants expressed in their ability to clearly remember each of the persons they imagined in relation to the Name-Word pairs. Two participants even expressed a reliance on real-world associations they had with some of the Names, against the instructions provided. Overall, it would seem that participants found some Names and narratives were more accessible than others, and these differences are reflected in the plots in Figure 4 (Appendix A). Some pairs, such as Clarice-Rifle or Loraine-Autumn, reveal large variance in performance based on whether the positive or negative narrative was presented, and also based on whether the pair was conditionalized as cued or baseline. Feedback from the post-experimental questionnaire also revealed perceived difficulty with Names that were less familiar to participants, such as Names that might be more popular with older generations (e.g. Eustice, Beatrice). As demonstrated in the case of Eustice-Clown, this perceived difficulty was not necessarily reflected in participants' actual performance on the surprise memory test.

Words which were perceived as more abstract or random by participants appear to have impaired performance for that Name-Word pair (e.g. Francine-Bridge, Vincent-Windmill). Short and familiar Names seem to relate to improved performance (Jim, Hal, Rory). Based on the understandings of RIF, it is possible that Names which shared a beginning sequence of letters presented inter-item competition upon recall. While inter-item competition may help to explain the variance across conditions for Names beginning with Cla- (Clarice, Clark, Claud), this effect does not appear in the case for Names beginning with Ma- (Martha, Mason, Maya).

Limitations

EVERYDAY GHOSTS

One important limitation of this study is that it does not assess the stimuli within the context of the original TNT paradigm without the imagination task manipulation. For this reason, any potential for the items used in this study to reduce or otherwise influence the process of suppression would not be clear, and lack of evidence for suppression cannot be distinctly attributed to either the stimuli or the imagination task. In line with this, while evidence of suppression was tested for the Name-Word pairs, the effects of suppression upon additional details related to each narrative were not assessed. Therefore, it is possible that participants suppressed details from the narratives that did not influence the recall of the associated Word. In this way, some aspects of suppression may not have been accounted for.

When asked what aspect of the imagination task proved most challenging, participants would most often answer that not enough time was provided to fully imagine a scenario and engage with the person whose Name was indicated. This presents two potential complications: first, that the participants did not have a strong concept of the person after exiting the narrative phase and, second, that the time afforded participants to complete the imagination task was insufficient to imagine realistic interactions. In either case (or both), this indicates that participants would have a limited capacity to imagine realistic interactions with the Named persons involved in each task. As the objective of this research is to develop a means of assessing naturalistic suppression, this presents an important consideration for how to structure the imagination task in future studies.

This relates to the possible complications which arise from having the Word response incorporated into the emotional narratives. If the conception of a Named person was unclear or became confused with other persons, then it would benefit the participant to rely on the Word response to recall as much as they could about the narrative simply in order to have a meaningful understanding of who they were supposed to interact with in the imagination task. While each participant met criterion in the the test-feedback phase, since there was no final criterion test of all of the pairs after the test-feedback concluded, there may have been deficits in

EVERYDAY GHOSTS

learning that were not accounted for. Although there was no report of this presenting complications, it must be noted that only two voice actors provided the work for the audio narratives, presenting a potential obstacle to participants of distinguishing the content from the voice it is spoken in.

Lastly, the comparison of coping style was not accomplished due to a lack of participants possessing a cognitive avoidant coping style. This meant that individual differences in memory performance could not be interpreted. Given the low incidence of cognitive avoidant copers, it will be important for future studies to account for more efficient recruiting strategies should they seek to evaluate individual performance based on cognitive avoidant or repressive tendencies.

Future Directions

Based on the findings of this exploratory research, there are many directions in which to continue developing a method for studying naturalistic suppression. In line with continuing this development, the recommendations listed here will focus upon how to improve this design.

One major limiting factor for this research was time, given the many pairs that needed to be learned to criterion as well as the many repetitions inherent to a design like the TNT paradigm. Reducing the number of Name-Word pairs to a more manageable count (24, perhaps) would save on time needed to learn all of the pairs and allow that time to be used for other useful checks and manipulations, such as a final test of all of the items (without feedback) before proceeding from the test-feedback phase. Tests of memory for narrative details should also be incorporated into future designs, both at the end of the narrative phase and as part of the surprise memory test at the end of the study. This would account for any suppression effects that do not target the associated response Word.

Beyond changing how time is arranged within a single session, it would be of extreme benefit to arrange a study that spanned multiple sessions. A two-session design, dividing the learning and test-feedback phase from the TNT and final phase, would be of appreciable benefit.

EVERYDAY GHOSTS

After learning Name-Word pairs, participants would be able to spend a longer span of time learning and developing their own concepts of the imagined persons related to each Name. Then in the second session participants would be able to focus completely on the imagination task, with more time afforded to each Name in the imagination task.

Especially in regard to the process of conceptualizing the imagined person as well as imagining a stressful scenario, a great deal of benefit would come from having more structure. Providing participants with certain pre-written details about a Named person, and the relationship that they and the participant share, would make the process of conceptualizing the Named person much easier for the participant. Similarly, in the case of imagining a very important task, providing the basic outline of a scenario will help reduce the time needed to imagine this context and begin engaging with the Named person in a meaningful way. In considering how to provide this structure, it may be worth looking at the methods used in forgiveness and memory studies (Noreen, Bierman, MacLeod, 2014). While this present design was beneficial in seeing how participants engaged with these kinds of stimuli on their own terms, providing participants with a more concrete basis from which to imagine both people and interactions will improve the ease with which they can engage in the imagination task, improve the depth of engagement in these imaginings, and promote a more realistic, vested involvement in the specific interactions which are imagined. For that matter, allowing the participants more time in the imagination task (30 seconds, perhaps) will also promote these benefits.

Separate from these specific changes to design, it is imperative to test the efficacy of these Name-Word pairs and narratives in a standard TNT experiment. Given that these materials present results that are comparable to those of other stimuli sets, this will allow any subsequent tests of the CNC variant of the TNT paradigm to attribute any suppressive behavior to the CNC manipulation. More than simply these stimuli, though, additional Name-Word pairs should be tested to investigate any mediating effects of different types of Name and Name-Word relations. Alternative formulations of narrative should also be considered. Future studies should

EVERYDAY GHOSTS

consider using facial stimuli as part of the design as well, perhaps replacing the Name to create Face-Word pairs. Another consideration would be to administer cues in the TNT phase via auditory signals rather than visual, such as hearing a voice (e.g. *“Hi, this is Charlotte.”*) instead of seeing the Name or a Face. Incorporating such visual and audio components will help provide a more enriched concept of the imagined person, establishing a more realistic experience for the participant and enhancing the ecological validity of the overall design.

Should future studies validate the success of the CNC variant in promoting suppression via instances of conflict, it will be necessary to then elaborate the techniques used by participants to achieve suppression. For this purpose, the IP/SP testing method will help to distinguish between whether a participant is utilizing direct suppression methods or whether they are using thought-substitution (Hulbert, Henson, Anderson, 2016).

Conclusions

In order to progress research of suppression induced forgetting closer to considering suppression as it occurs in the real world, this research replaced the explicit instructions relied upon by traditional forms of the TNT paradigm with a conflict-motivated design. The results of this exploratory design did not present evidence of suppression, and the design of the study does not distinguish the exact reason that this evidence was not observed. All the same, feedback received from participants who not only engaged with these stimuli but did so in the context of an applied design has generated important considerations of how to proceed in developing these methodologies. Notably, the already significant change of replacing the explicit TNT instructions with implicit CNC instructions were not properly supported by the remaining TNT structure. In order to study the effect of conflict-motivated suppression, extensive rather than minimal changes must be applied to the TNT paradigm as these methods are developed. While there are many directions in which to progress the development of this CNC variant, priority must be placed on assessing whether this novel stimulus set can produce results that are consistent with other stimuli sets in a standard TNT design. In following these lines of inquiry this continuing

EVERYDAY GHOSTS

research hopes to establish new approaches to understanding suppression as it occurs in the day-to-day and lead to better understandings of how these ghosts, traumatic or otherwise, come to be forgotten.

References

- Abel, M., & Bäuml, K. H. T. (2017). Testing the context-change account of list-method directed forgetting: The role of retention interval. *Journal of Memory and Language*, 92, 170-182.
- Anderson, M.C., Bjork, R., Bjork, E. (1994). Remembering Can Cause Forgetting: Retrieval Dynamics in Long-Term Memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition*. Vol. 20, No. 5, (pp. 1063-1087).
- Anderson, M. C., Green, C. (2001) Suppressing Unwanted Memories by Executive Control. *Nature*, Vol. 410, pp 366-369
- Anderson, M.C., Hanslmayr, S. (2014). Neural mechanisms of motivated forgetting. *Trends in Cognitive Sciences*.
- Banich, M.T., Mackiewicz, K.L., Depue, B.E., Whitmer, A.J., Miller, G.A., Heller, W. (2009). Cognitive control mechanisms, emotion and memory: A neural perspective with implications for psychopathology. *Neuroscience and Biobehavioral Reviews*, 33, pp 613-630.
- Bastin, C., Feyers, D., Majerus, S., Balteau, E., Degueldre, C., Luxen, A., ... & Collette, F. (2012). The neural substrates of memory suppression: a fMRI exploration of directed forgetting. *PloS one*, 7(1), e29905.
- Baumeister, R. F. & Bratslavsky, E. (2001). Bad Is Stronger Than Good. *Review of General Psychology*, Vol. 5. No. 4. pp 323-370.
- Baumeister, R. F., Bratslavsky, E., Muraven, M., & Tice, D. M. (1998). Ego depletion: Is the active self a limited resource?. *Journal of personality and social psychology*, 74(5), 1252.
- Bäuml, K., Pastötter, B., Hanslmayr, S. (2010). Binding and inhibition in episodic memory—Cognitive, emotional, and neural correlates. *Neuroscience and Biobehavioral Reviews*. Vol. 34, No. 7, (pp. 1047-1054).
- Benoit, R.G., Anderson, M.C. (2013). Opposing mechanisms support the voluntary forgetting of unwanted memories. *Neuron* 76, 450-460.
- Benoit, R.G., Davies, D.J., Anderson, M.C. (2016). Reducing future fears by suppressing the brain mechanisms underlying episodic simulation. *Psychological and Cognitive Sciences*. www.pnas.org/cgi/doi/10.1073/pnas.1606604114
- Bjork, R., Bjork, E., Anderson, M.C. (1997). Varieties of Goal-Directed Forgetting In J.M. Golding, C.M. MacLeod (Eds.) *Intentional Forgetting: Interdisciplinary approaches*. (pp. 103-137) Mahwah, NJ: Lawrence Erlbaum Associates.
- Bradley, M. M., Lang, P. J. (1999) Affective norms for English words (ANEW): Instruction manual and effective ratings. *Technical Report C-1, The Center for Research in Psychophysiology, University of Florida*.

EVERYDAY GHOSTS

- Coman, A., Manier, D., Hirst, W. (2009). Forgetting the Unforgettable Through Conversation. *Psychological Science*. Vol. 20, No. 5, (pp. 627-633)
- Cuc, A., Koppel, J., Hirst, W. (2007). Silence Is Not Golden: A Case for Socially Shared Retrieval-Induced Forgetting. *Psychological Science*. Vol. 18, No. 8, (pp. 727-733)
- Dehli, L., & Brennen, T. (2009). Does retrieval-induced forgetting occur for emotional stimuli?. *Cognition and emotion*, 23(6), 1056-1068.
- Depue, B. E., Curran, T., Banich, M. T. (2007) Prefrontal Regions Orchestrate Suppression of Emotional Memories via a Two-Phase Process. *Science*, Vol. 317, pp 215-219
- Detre, G.J., Natarajan, A., Gershman, S.J., Norman, K.A. (2013). Moderate levels of activation lead to forgetting in the think/no-think paradigm. *Neuropsychologia*.
- Erdelyi, M.H. (2006). The Unified Theory of Repression. *Behavioral and Brain Sciences*, 26, pp 499-551.
- Erskine, J., Kvavilashvili L., Myers L., Leggett S., Davies S., Hiskey S., Hogg J., Yeo S., Georgiou G. (2014). A longitudinal investigation of repressive coping and ageing. *Journal of Aging & Mental Health*, Vol. 20, No. 10, (pp. 1010-1020).
- Gagnepain, P., Hulbert, J., & Anderson, M. C. (2017). Parallel regulation of memory and emotion supports the suppression of intrusive memories. *Journal of Neuroscience*, 37(27), 6423-6441.
- Geraerts, E., McNally, R.J. (2007). Forgetting unwanted memories: Directed forgetting and thought suppression methods. *Acta Psychologica* 127, (pp. 614-622).
- Hertel, P.T., Maydon, A., Ogilvie, A. (Under Peer Review). Ruminators (Unlike Others) Fail to Show Suppression-Induced Forgetting on Indirect Measures of Memory. *Clinical Psychological Science*.
- Hertel, P.T., McDaniel, L. (2010). The suppressive power of positive thinking: Aiding suppression-induced forgetting in repressive coping. *Cognition and Emotion*. 24(7), pp 1239-1249
- Hulbert, J. C., Henson, R. N., & Anderson, M. C. (2016) Inducing Amnesia through Systemic Suppression. *Nature Communications*, 7, 11003.
- Hulbert, J.C., Hirschstein, Z., Brontë, C.A.L., Broughton, E. (2017). Unintended side effects of a spotless mind: theory and practice. *Memory*.
- Hupbach, A., Weinberg, J. L., & Shiebler, V. L. (2018). Forget-me, forget-me-not: Evidence for directed forgetting in preschoolers. *Cognitive Development*, 45, 24-30.
- Hupbach, A. (2018). The ever-changing engram: towards an integrated understanding of long-term memory dynamics. *Memory*. 26(3), (pp. 291-293).

EVERYDAY GHOSTS

- Hupbach, A. (2017). Long-term effects of directed forgetting. *Memory*, 26(3), (pp. 321-329)
- Kensinger, E. A., & Schacter, D. L. (2008). Memory and emotion. *Handbook of emotions*, 3, 601-617.
- Kuhbandner, C., Bäuml, K. H., & Stiedl, F. C. (2009). Retrieval-induced forgetting of negative stimuli: The role of emotional intensity. *Cognition and Emotion*, 23(4), 817-830.
- Küpper, C. S., Benoit, R. G., Dalgleish, T., & Anderson, M. C. (2014). Direct suppression as a mechanism for controlling unpleasant memories in daily life. *Journal of Experimental Psychology: General*, 143(4), 1443.
- Krohne, H.W., Egloff, B., Varner, L.J., Burns, L.R., Weidner, G., Ellis, H.C. (2000). The Assessment of Dispositional Vigilance and Cognitive Avoidance: Factorial Structure, Psychometric Properties, and Validity of the Mainz Coping Inventory. *Cognitive Therapy and Research*, Vol. 24, No. 3, pp 297-311.
- LeMoult, J., Hertel, P. T., & Joormann, J. (2010). Training the forgetting of negative words: The role of direct suppression and the relation to stress reactivity. *Applied Cognitive Psychology*, 24(3), 365-375.
- Levy, B. J., & Anderson, M. C. (2008). Individual differences in the suppression of unwanted memories: the executive deficit hypothesis. *Acta psychologica*, 127(3), 623-635.
- MacLeod, C.M. (1998). Directed Forgetting In J.M. Golding, C.M. MacLeod (Eds.) *Intentional Forgetting: Interdisciplinary approaches*. (pp. 1-57) Mahwah, NJ: Lawrence Erlbaum Associates.
- Marx, B.P., Marshall, P.J., Castro, F. (2008). The moderating effects of stimulus valence and arousal upon memory suppression. *Emotion*. Vol. 8, (pp. 199-207).
- Mauss, I.B., Robinson, M.D. (2009). Measures of emotion: A review. *Cognition and Emotion*, 23(2), pp 209-237
- Mischel, W., Shoda, Y., & Rodriguez, M. I. (1989). Delay of gratification in children. *Science*, 244(4907), 933-938.
- Moos, R. H. (1993). Coping responses inventory: Adult form: Professional manual. Psychological Assessment Resources, Incorporated.
- Moos, R. H. (1995). Development and applications of new measures of life stressors, social resources, and coping responses. *European Journal of Psychological Assessment*, 11(1), 1-13.
- Moos, R. H. (2004). Coping Responses Inventory: An update on research applications and validity. Odessa, FL: Psychological Assessment Resources.
- Nørby, S., Lange, M., Larsen, A. (2010). Forgetting to forget: on the duration of voluntary

EVERYDAY GHOSTS

- suppression of neutral and emotional memories. *Acta Psychologica* Vol. 133 Iss. 1, (pp. 73-80).
- Noreen, S., Bierman, R. N., & MacLeod, M. D. (2014). Forgiving you is hard, but forgetting seems easy: can forgiveness facilitate forgetting?. *Psychological science*, 25(7), 1295-1302.
- Noreen, S., & MacLeod, M. D. (2014). To think or not to think, that is the question: Individual differences in suppression and rebound effects in autobiographical memory. *Acta psychologica*, 145, 84-97.
- Pronk, T. et al. (2010). What it takes to forgive: when and why executive functioning facilitates forgiveness. *J. Pers. Soc. Psychol.* 98, 119–131
- Roediger III, H. L., Karpicke, J. D. (2006). Test-Enhanced Learning: Taking Memory Test Improves Long-Term Retention. *Psychological Science*, Vol 17, Issue 3, pp 249-255
- van Schie, K., Geraerts, E., Anderson, M.C. (2013). Emotional and non-emotional memories are suppressible under direct suppression instructions. *Cognition and Emotion*. Vol. 27, No. 6, (pp. 1122-1131)
- Schwarzer, R., Schwarzer, C. (1996). A Critical Survey of Coping Instruments. Chapter prepared for: Handbook of Coping.
- Streb, M., Mecklinger, A., Anderson, M. C., Lass-Hennemann, J., & Michael, T. (2016). Memory control ability modulates intrusive memories after analogue trauma. *Journal of affective disorders*, 192, 134-142.
- Waugh, N. C., & Norman, D. A. (1965). Primary memory. *Psychological review*, 72(2), 89.
- Wegner, D.M., Schneider, D.J., Carter III, S.R., White, T.L. (1987). Paradoxical Effects of Thought Suppression. *Journal of Personality and Social Psychology*, Vol 53, No 1, pp 5-13.
- Wilkowski, B.M. et al. (2010) How does cognitive control reduce anger and aggression? The role of conflict monitoring and forgiveness processes. *J. Pers. Soc. Psychol.* 98, 830–840
- Wylie, G. R., Foxe, J. J., & Taylor, T. L. (2007). Forgetting as an active process: an fMRI investigation of item-method–directed forgetting. *Cerebral Cortex*, 18(3), 670-682.

Appendices

Appendix A: Figure 4

Appendix B: Name-Word pairs and narratives

Appendix C: Demographic Questionnaire

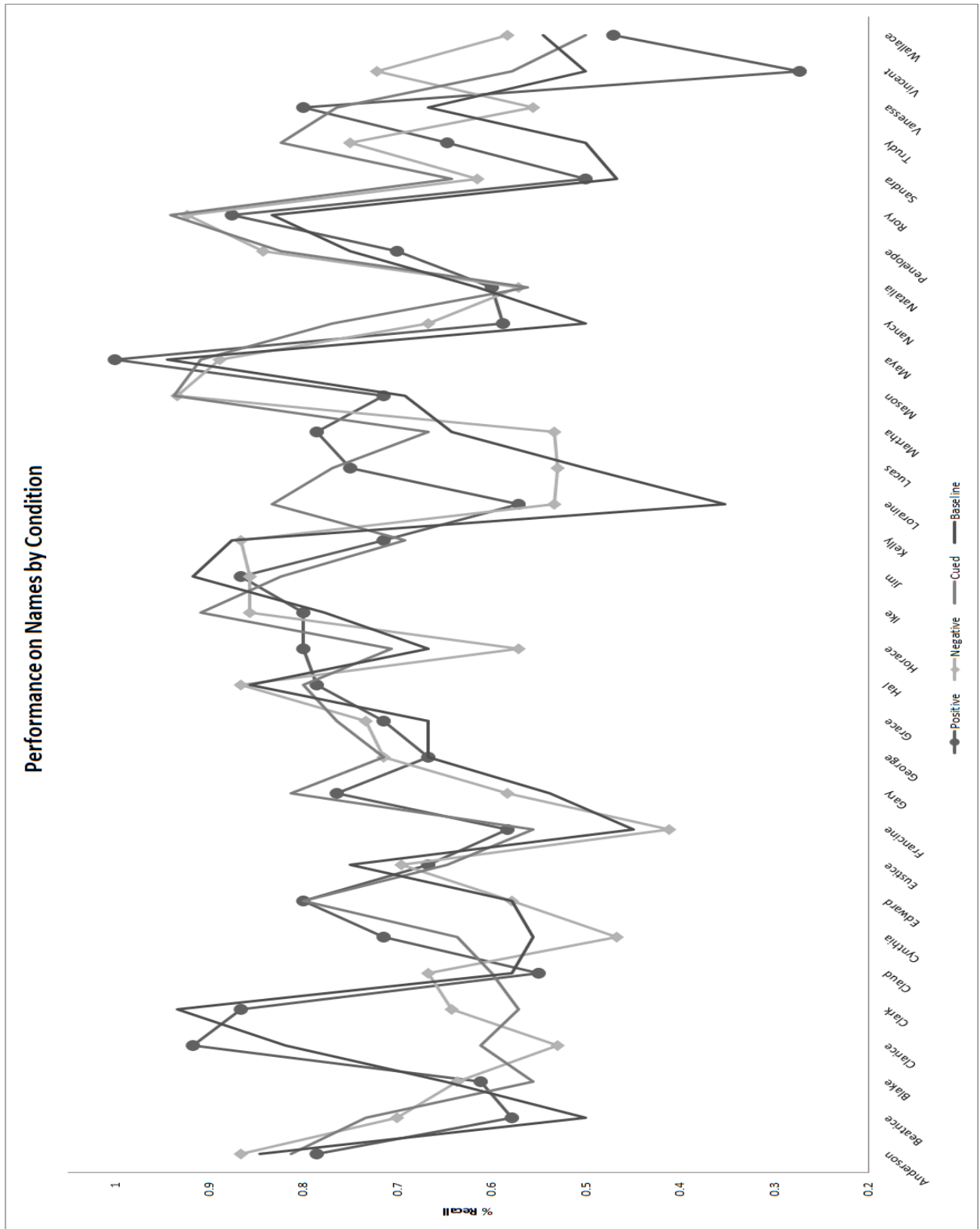
Appendix D: Sample post-experiment questionnaire

Appendix E: Experimenter script

Appendix F: IRB proposal, December 2017

Appendix G: IRB approval

Appendix A



Appendix B

Critical Items

1. Nancy--Wedding
 positive) "Hi there! Would you do me the honor of being one of the speakers at my wedding? I'm sure you can think of plenty of interesting stories from when we were younger! Let me know."
 negative) "Listen, um, I didn't want to do it this way but I just can't anymore. The wedding is off. I've already left, um, I'm back home with my mom and dad. Please, don't call back."
2. Vincent--Windmill
 positive) "How are you? I'm planning a trip to my family's farm, the one with the big windmill! You want to join?"
 negative) "You've got enough hot air in your head to power a windmill. Honestly, you're the dumbest person I know."
3. Trudy--Rock
 positive) "Hey, guess who just got engaged! And you should see the size of the rock in this ring! Call back, soon."
 negative) "Sorry, but I'm not interested in seeing you again. Honestly, it was like having dinner with a rock last night."
4. Edward--Computer
 positive) "Hey babe, would you come take a look at my computer? I can't wait to see you. Since you'll be over here, maybe we could catch a movie, too?"
 negative) "Hello, I'm so sorry but there was an accident and your computer was... broken. We've tried to rescue the files, but there was nothing we could do."
5. Penelope--Cake
 positive) "Good morning! We can't wait for you to arrive at the party- the cake is perfect and I'm sure everyone is going to have a wonderful time."
 negative) "When was the last time you stuck to a diet or hit the gym? Cake must be a favorite meal of yours."
6. Grace--Pet
 positive) "Hi! I know you were looking for one, and a relative of mine is looking to sell a pet from the litter his just had. They're so soft and fuzzy, and I'm sure he'd give you a good price."
 negative) "Hey, you're always spending time with that depressing little pet of yours? Don't you have any real friends? You should get out more."
7. Mason--Ballet
 positive) "Just wanted to say hello- back in the day I remember you were so talented in ballet dancing. Do you still practice it?"
 negative) "Seriously, on top of being a theatre dork you picked up ballet? I guess it's true what they say: dumb people choose dumb pastimes."
8. Clarice--Rifle
 positive) "Hey, sorry if this is a bad time. I don't know if you've ever handled a rifle before, but I like to go down to the shooting range every so often just for fun. If you want to join in let me know, I'd be happy to teach you!"
 negative) "Of all the moronic things to do... You forgot to bring your rifle with you on our hunting trip. Because of your incompetence I couldn't have had a worse time."
9. Sandra--Fish
 positive) "Hi there! You've been doing a lot of traveling, so I thought I'd make up some fish for dinner, whatever way you'd like it."
 negative) "I can't do this anymore. You act like a fish out of water around me- you're cold, you don't talk to me anymore. I just don't know what to do."

EVERYDAY GHOSTS

10. Lorraine--Autumn

positive) "It's so nice to have Autumn again- it may be silly of me, but the cooler weather and the changing of the leaves makes me feel that much more alive."

negative) "There's nothing to enjoy about Autumn. Just idiots like you raving about pumpkins, cold rain, and the promise of even colder weather around the corner."

11. Anderson--Tomato

positive) "Hey, it's me. I picked up a bunch of tomatoes for tonight- after all this time unable to get together, I'm going to make our reunion dinner really special."

negative) "Now listen, I have nothing against you, but you just aren't a hard worker. At This point I wouldn't trust you to water my tomatoes back home. Show some effort before asking for a raise."

12. Claud--Hill

positive) "Heyo! Do you remember one summer, it must have been a long time ago, there was that big hill all lit up with lights for the barbecue? I liked that a lot."

negative) "Hi. You had a bit of trouble with that hill on the walk yesterday- bit out of shape, I guess. Better be careful, or you'll put on even more than you already have."

13. Horace--Letter

positive) "Hello, I think there was a little mixup between our mail for some reason. I left the letter for you under your door- hope it's lots of good news!"

negative) "Have you got my mail? I've been trying to get in contact with you for days and I'm expecting a really important letter. Please, just call me!"

14. Ike--Paint

positive) "Hey there, just wanted to show my thanks for all your help. Be careful in the kitchen since the paint may still be wet. It was a lot of work, but for a friend like you it's worth it."

negative) "Sweety, I get it, you want to be an artist, to paint. But that won't pay your bills once you get out there in the real world. You're smarter than this- remember, we are paying for your school."

15. Clark--Key

positive) "Sorry to bother you, but I think I left my key in the apartment. I'm such a clutz sometimes- just let me know when you have the chance to check, and have a good one!"

negative) "Hi. I really shouldn't have to tell you this over a message but, you used me. I trusted you so much, gave you the key to my heart. I never expected you to want to do that, to be willing to do that. I don't know anything anymore."

16. Martha--Watch

positive) "Hello, dear. That new watch of yours suits you so well. Very sophisticated and charming. Take care."

negative) "You don't deserve to have that watch. I was the one who cared for him, who was there. What did you ever do for him, huh?"

17. Vanessa--Gold

positive) "I was just thinking about it, and I realized you're someone precious I hold onto. Like a gold ring you find somewhere on the beach, I'm lucky that I found you."

negative) "Hi, I just wanted to call and give some advice- at your level of experience it's cute to aim for gold, but let's be realistic. You're never going to reach it. At this point you're kind of just a joke."

18. Beatrice--Attic

positive) "Hi there, when you get the chance to check it, I think I left something of mine in your attic. We spend way too much time up there goofing off. B-bye"

negative) "I'm done with your nonsense. I've locked your things up in the attic until you finally learn how to behave right. You're a wretched brat, and I'll see it you are raised properly."

EVERYDAY GHOSTS

19. Gary--Rose

positive) "Congratulations! This is so amazing for you, and you deserve it so much. I'm going to come by soon after picking some roses! See you soon!"

negative) "Hey, I don't think I'll make it to your place. From what I've heard, you're still the gross, decaying rose of a person I knew before, so no."

20. Francine--Bridge

positive) "Hi. One day will you go with me and walk across an old stone bridge? Walking quietly, the rushing water far below us... I'd enjoy sharing that with someone close like you."

negative) "Hey, where are those files I asked you to pick up? It's like every bridge you make with someone, you want to burn it down. This is the last time I'll ever trust you."

21. Hal--Medicine

positive) "Hey, just wanted to check in on you. I hope the medicine you took helped that cough of yours- maybe I'll see you soon. Feel better."

negative) "Hello, we're calling to inform you that the cost of your medicine can no longer be covered under the terms of your current insurance. Please call with any questions."

22. Blake--Jewel

positive) "You are a real jewel, I tell you. You may not believe me, but I thought you were just spectacular out there."

negative) "I'm sorry... We just don't have enough money for the operation. We'd need a jewel the size of my fist to pay for everything. I... I just don't know how to break it to the kids."

23. Lucas--Flag

positive) "Hello, I wanted to compliment you on your presentation the other day. You really know your stuff about the flag, and in case it wasn't already clear, you piqued my interest."

negative) "I don't really know about us. I'm seeing a lot of red flags with you, and I've got to trust my gut on this. Goodbye."

24. Wallace--Dinosaur

positive) "I don't know how you knew about it, but my little one's favorite thing recently is dinosaurs. The book you got for them is their favorite now. Thank you so much."

negative) "Hey, by the way I'm skipping out on our plans for tonight. I feel like looking for a hot date, and with the state you're in you look like a dinosaur. Catch you another time."

25. Rory--Snow

positive) "Okay, don't make fun of me- it just snowed and I want to know if you're free to play. You, me, and our sleds like the good old days. What do you say?"

negative) "Hey, just calling to cancel our plans. It's starting to snow, and I'd rather not risk the drive even though it's short. I wasn't exactly looking forward to being with you anyway."

26. Cynthia--Dress

positive) "Oh my gosh! That dress you wore looked so good on you (and everyone else knew it, too). Have a great day, beautiful."

negative) "You looked about as good in that dress as a walrus would. Dumb and bloated. Stick to your usual outfit- at least then you're less noticeable."

27. Jim--Honey

positive) "Guess what? My dad just pulled in a batch of fresh honey, and I wanted to ask my best friend if they wanted some first. Let me know!"

negative) "What are you trying to pull acting so sweet all of a sudden? No matter how much honey you glob on a turd, it's still a turd. Same goes for you."

28. Eustice--Clown

positive) "Hello sweetheart, do you remember back when you were little and spent time at our house? You were such a cute little clown, and you had so much fun!"

EVERYDAY GHOSTS

negative) “Hi, um, I’m sorry it’s nothing personal. I don’t want to work with you on this next assignment. You always act like a clown, and I need someone more serious.”

29. Maya--Star

positive) “Hey, last night was incredible. Looking up, seeing the sky lit up like that. Every time I see that star, I can’t help but think of you.”

negative) “Hello, listen I’ve got to be straight with you as your agent. You’re going nowhere. You’ll never make it as a star with a pathetic gig like this. Never.”

30. Kelly--Blue

positive) “Long time no see! I know your special day is coming up, so I’ve sent a big blue package to you- hopefully it makes you smile.”

negative) “I just don’t get you. You’re acting completely blue, despondent, empty. I feel like I’m talking to a child, like you don’t even hear what I’m actually saying. Maybe you just don’t want to.”

31. George--Viper

positive) “Hey there! Everyone was talking about getting together again soon for another match. You’ve got the ferocity of a viper, and we’re really relying on all of that energy. Let me know!”

negative) “You couldn’t just let me be happy, had to go and play with my emotions like that. Well you’ll get yours, you sick little viper! I don’t know whether everything you told me was fake, but I guess it doesn’t matter anymore.”

32. Natalia--Worm

positive) “Hello! I can’t believe that guy from last night- he actually got down onto the floor and started doing the worm! Oh gosh- I’m glad you were there, otherwise no one would believe me.”

negative) “Quit trying to hang out with us. You’re a pathetic little worm who’ll never accomplish anything. Who would want to hang out with someone like that? Bye.”

Practice Items, 2 presented at the beginning and end of each set (not for TNT phase)

33. Oliver--Ruler

positive) “Hi, I just wanted to thank you again for letting me borrow your ruler for my exam- you’re a real life-saver!”

negative) “How’s it going? I think you stole my ruler. Things have been going missing ever since I met you, so it’s pretty obvious. You’re a real slime.”

34. Charlotte--Statue

positive) “Hello, um, I was wondering if you’d be interested in posing for a statue I’m making. I think you’d be a really great fit for it, and we can talk about the details. Talk to you soon!”

negative) “Hello, this is your supervisor. Recently I’ve noticed that you’ve been slow with projects- sometimes I’ll walk by and you’re like a statue. Call me back so that we can discuss things.”

35. Philip--Blanket

positive) “Hey there, what a great day! Everyone had a lot of fun, and it would be great if you can come to the next outing, too. Just remember to bring a blanket for the cold.”

negative) “I don’t get why you don’t want to go out. Stop being such a wet blanket and have some fun for once! Whatever, see you around.”

36. Zoey--Lemon

positive) “Hi! A while ago I sent a lemon to you. It was such a nice one, and it reminded me of you for some reason. Hopefully you enjoyed it. Bye!”

negative) “Hey, guess I’ll just say it. You’re weak, and fragile. On top of that you’re a sour lemon, making stress for everyone else on the team. Just quit it all and leave us alone.”

Appendix C

Demographic Questionnaire

Participant Number: _____

AGE: _____

GENDER (circle one): Female Male Other

HANDEDNESS (circle one): Left Right Ambidextrous

ARE YOU A NATIVE SPEAKER OF ENGLISH? (circle one): Yes No

ETHNIC CATEGORY (check one of the following):

____ Hispanic or Latino

____ Not Hispanic or Latino

____ Do not wish to report

RACIAL CATEGORIES (check at least one of the following):

____ American Indian or Alaskan Native

____ Asian

____ Native Hawaiian or Other Pacific Islander

____ Black or African American

____ White

____ Do not wish to report

HAVE YOU EVER BEEN DIAGNOSED WITH SOME FORM OF LEARNING DISABILITY, ATTENTION DISORDER, OR NEUROLOGICAL CONDITION (check one, providing a description, if appropriate)?

() Yes, the following:

() No, but I have the following undiagnosed problems that fall into one of these categories:

() No

Appendix D

Post-Experiment Questionnaire

Subject ID: _____

1. For the audio narratives that I listened to...

a. I could clearly distinguish between which narratives were positive in nature and which were negative.

0 (Never) 1 (Rarely) 2 (Sometimes) 3 (Often) 4 (Always)

b. For those narratives I thought were negative, I felt personally affected by what was said.

0 (Never) 1 (Rarely) 2 (Sometimes) 3 (Often) 4 (Always)

c. For those narratives I thought were positive, I felt personally affected by what was said.

0 (Never) 1 (Rarely) 2 (Sometimes) 3 (Often) 4 (Always)

2. For the Imagination task...

a. When the Names shown during the negative audio messages were presented I was able to tell because they reminded me of the negative feelings I experienced from those messages.

0 (Never) 1 (Rarely) 2 (Sometimes) 3 (Often) 4 (Always)

b. When I imagined working with the person whose Name was displayed, I had a hard time envisioning who that person was (what they looked like).

0 (Never) 1 (Rarely) 2 (Sometimes) 3 (Often) 4 (Always)

c. When I imagined working with the person whose Name was displayed, I didn't have a clear idea of how that person related to me (as a friendly/positive person or a negative person).

0 (Never) 1 (Rarely) 2 (Sometimes) 3 (Often) 4 (Always)

d. While imagining the process of working with the person whose Name was displayed, I would try to put aside the negative emotions I felt from the audio phone message that person had left me.

0 (Never) 1 (Rarely) 2 (Sometimes) 3 (Often) 4 (Always)

e. During the Imagination task, I would think back to the Word response which corresponded to the Name presented to me.

0 (Never) 1 (Rarely) 2 (Sometimes) 3 (Often) 4 (Always)

3. Sometimes people suspect that their memory will be tested on response words for Names and Word responses later on, even though they have been told that the initial memorization was simply an exercise to prepare for the main task. Each of the following three statements is intended to measure whether you ever INTENTIONALLY made an effort to think about the Words for the Names presented during the Main Phase (so please only consider those instances in which you purposefully thought of the

EVERYDAY GHOSTS

response WORD, not those in which a response automatically came to mind). Please make a rating for each statement and be as honest as possible with your ratings.

Never, Rarely, Sometimes, Frequently, Very Frequently

When I saw the NAME, I thought back to the WORD which went along with it.	0	1	2	3	4
---	---	---	---	---	---

After a NAME went off the screen, I only thought about what they had said in the earlier message.	0	1	2	3	4
---	---	---	---	---	---

When I saw a NAME, I thought about the response that went with it to improve my memory for that pair.	0	1	2	3	4
---	---	---	---	---	---

4. How often did you continue to think of one Name in the Imagination task even when a new Name was presented on the screen?

0 (Never) 1 (Rarely) 2 (Sometimes) 3 (Often) 4 (Always)

If your answer was greater than 0 (Never), describe how long you continued to think about the Name during the subsequent Imagination tasks and how the thoughts of this number judgement either helped or hurt your performance on the subsequent digit judgments:

5. How often did you relate the Word responses from separate Name-Word pairs to one another when thinking about how to respond to a Name prompt?

0 (Never) 1 (Rarely) 2 (Sometimes) 3 (Often) 4 (Always)

Please list any words that stuck out, were difficult, amusing, or otherwise memorable, describing why they were especially distinctive.

6. How often did you relate the phone messages for separate Names (people) to one another when listening or in later parts of the experiment, either because they were very similar or because you mistook one for another?

0 (Never) 1 (Rarely) 2 (Sometimes) 3 (Often) 4 (Always)

EVERYDAY GHOSTS

Please list any words that stuck out, were difficult, amusing, or otherwise memorable, describing why they were especially distinctive.

7. For the Imagination task, it was more difficult to imagine working with certain people whose Name was presented than others.

0 (Never) 1 (Rarely) 2 (Sometimes) 3 (Often) 4 (Always)

Please describe exactly what made certain NAMES/people more difficult to engage with and what techniques you used to help accomplish the task:

8. How much easier/harder would you say it was to successfully complete the Imagination task when the Name had been previously paired with a positive message as opposed to a negative one?

Positive was much easier		No difference		Negative was much easier
1	2	3	4	5

9. Last night, how many hours of sleep did you get? (estimate as accurately as possible)

≤2 3 4 5 6 7 8 9 10 ≥11

10. During the Imagination task, I was able to develop identities of people attached to each name which were distinct and separate from any people from my own life whose names were presented in this experiment.

Yes/No

11. Prior to the experiment, to what extent had you been aware of the following experimental paradigms and the related findings? (Please select one option for each of the following):

a. Think/No-Think (TNT) Procedure (e.g., Anderson et al., 2001; 2004)

No awareness	1
Heard of the name only	2
Knew the procedure, but not the findings or predictions	3
Knew the findings & predictions	4
Have participated or conducted such a study previously	5

b. Thought Suppression/White Bear (e.g., Wegner, 1987)

No awareness	1
Heard of the name only	2
Knew the procedure, but not the findings or predictions	3
Knew the findings & predictions	4
Have participated or conducted such a study previously	5

EVERYDAY GHOSTS

c. Retrieval-Induced Forgetting (e.g., Anderson, Bjork & Bjork, 1994)

No awareness	1
Heard of the name only	2
Knew the procedure, but not the findings or predictions	3
Knew the findings & predictions	4
Have participated or conducted such a study previously	5

12. Regardless of whether you have heard of any of the above-named procedures, have you heard about research on any of the following ideas:

a. Repeatedly pushing an unpleasant/undesirable memory out of mind (i.e., exerting memory control) has the effect of suppressing that memory, making it harder to retrieve at later times, even when one wants to remember it.

No awareness	1
Heard of the name only	2
Knew the procedure, but not the findings or predictions	3
Knew the findings & predictions	4
Have participated or conducted such a study previously	5

b. Attempting to suppress/not think about certain thoughts paradoxically makes you more likely to think about those things than one would otherwise be liable to do.

No awareness	1
Heard of the name only	2
Knew the procedure, but not the findings or predictions	3
Knew the findings & predictions	4
Have participated or conducted such a study previously	5

c. The very act of remembering can hurt your ability to retrieve related memories.

No awareness	1
Heard of the name only	2
Knew the procedure, but not the findings or predictions	3
Knew the findings & predictions	4
Have participated or conducted such a study previously	5

13. Before, or at any time during, the experiment did you believe that there would be a final test for response words, with the prediction that WORD responses to NAMEs would be either easier or harder to recall based on the paired message (select one)?

No I definitely didn't suspect a test	1
Might have suspected a test	2
Unsure if I suspected a test	3
Suspected a final test for Responses, but didn't guess the prediction	4
Definitely suspected a final test & guessed the predictions	5

If you suspected that you might be tested on the NAME-WORD pairs later on in the experiment, please indicate, in the space below, anything you did in response to this suspicion:

Appendix E

Experimenter Script, E_G

Introduction

Hello and thank you for coming in to participate in today's experiment. Would you like any water or to use the restroom? Before we get started, then, I'd like you to read over this brief consent form and make sure you understand the nature of what we're studying here today. When you feel ready to, please sign on the line below, and I'll be happy to answer any questions you might have.

[Give them time to sign the consent form, prep **E_Gstudy**]

Now, just to explain a few things, as you may have read from the consent form, this is a study focused around attentional control in social interactions. This work is not only something I'm conducting for my senior project, but has relevance in determining how certain kinds of social interactions impact us in our day-to-day life.

There are several parts of the experiment, and to make it easier for the both of us I'll be explaining each specific section as we come to it.

Do you have any questions?

Great! Then, I'll explain a bit about this first phase...

Study Phase

In this first phase you'll be presented with a series of Name-Word pairs. For each Name prompt there is a Word response, for instance "Charlotte--Statue." Charlotte is the name prompt and Statue is the word response. It is important that you study each Name-Word pair carefully so that when you are prompted with a Name (Charlotte) you are able to provide the correct Word response that goes with it (Statue).

As you study each pair, we would like you to form a mental image of the person whose name is presented in the pair... Thus in this example, you would imagine what Charlotte looks like, maybe even what they're like as an individual. It is very important that you imagine someone who is not from your own life. If you happen to know a Charlotte, you must imagine a new person when considering Charlotte for this experiment. Having a distinct mental image for each Name and Word will be important for later portions of the experiment as well.

You'll have four seconds to study each pair. Once we've cycled through all of the pairs twice, we'll move on to the next part of the experiment.

Any questions?

[Run **E_Gstudy**]

Okay, that was great! Do you have any questions before we move on?

Swell! The next thing we'll have you do is rehearse the Name-Word pairs you just studied to make sure you've learned them well.

Each Name will be presented alone on the screen, without the Word that corresponds to it. We'd like you to provide the correct Word response to each Name that is presented. Just try your best, and don't be discouraged if you are unable to come up with the correct response Word to some of the names. You'll have multiple opportunities to master them. In fact, after each Name

EVERYDAY GHOSTS

disappears from the screen, the computer will briefly present the correct Word. Please take advantage of this feedback to reinforce your knowledge of the Name-Word pair. This is an opportunity for you to continue learning those Name-Word pairs you may not remember as well as others.

Do you have any questions?

Then let's continue...

[Continue (Press Enter) **E_Gd_o**]

Good job! Now that you've learned all of the Name-Word pairs we can move on to the next portion of the study.

Sound good?

Narrative Phase

In this next section of the study you'll be listening to audio recordings related to the Name-Word pairs that you've studied. These recordings will be presented to you in the form of messages, such as you might receive on the inbox of your cell or home phone.

As you listen to each message, the Name of the person speaking will be displayed visually on the screen. While the name is displayed and the phone message is playing, please engage with the mental image of the person that corresponds to the Name, the mental image you developed in earlier parts of the experiment. While it may seem silly, we would like you to try your best to imagine that these phone recordings are *actual* people who have left these messages for you, specifically. It is very important that you take the content of these messages seriously. After all, these people calling you have your phone number for a reason, right? These people know you and interact with you for a reason- each one has a relationship to you. Please use all of the new information from these messages to help create a strong, very clear concept of this person and your relationship to one another.

Although the voices from the different messages do not differ very much, we emphasize the importance of envisioning a distinct person for each Name. In fact, this places all the more emphasis on your use of imagination to create a clear representation of the person.

I realize that a lot is being asked of you here, so if you have any questions about this next part of the experiment please go ahead and ask.

[Run **E_Gnarr**]

Okay! I know that was a lot to take in. How are you doing?

If you're ready, we'll move on to the next phase of the experiment where you'll be practicing the two tasks that will be involved in the Main Phase of the study. Okay?

Practice Phase

In this next part of the experiment you'll have the chance to practice the Imagination task which is the focus of the Main phase of the experiment.

You'll be presented with the Name from the Name-Word pairs yet again. In this case, though, the imagination task is slightly different. We still want you to keep that strong mental image of the person whose name is presented on the screen, strengthened from your work not only with the Study phase in the beginning but also as you listened to the Narratives a little while ago.

Now what we want you to do is imagine interacting with this person on an important task.

EVERYDAY GHOSTS

Maybe it's an assignment from your professor or your employer. Regardless of the *kind* of task that you imagine (a group presentation, or an article...) it must be one that is extremely important and requires that both you and the person who you are working with perform at your very best.

While you're engaging with this person (considering how to talk to them, how you go about completing the assignment between the two of you) you should try your best to keep in mind your relationship with them and who they are to you- a sibling, a friend, perhaps a bully. It is this attentional control that we wish to study: how well people are able to work with a person based on their previous interactions together. In order to study this, we ask you to indicate how difficult it is for you to engage with that particular person.

For example:



Here you can see the Name is displayed in the center as before. After a few seconds, during which you will have completed this imagination task, the scale will be presented beneath it. You will need to press 1 to indicate that it was easy for you to imagine working with this person (meaning that it was easy for you to get along with and work with this person), 2 to indicate that it was mostly easy but not quite, 3 that it was more challenging to imagine working with this person, or 4 to indicate that it was difficult to imagine working with this person.

When we say "Easy" or "Difficult" we mean not only whether you were successful in imagining working with this person, but whether you imagined the person involved as best as you could have. In every aspect of this imagination task, we want you to incorporate as much detail as possible- visual details and emotional details in particular serve to create the most vivid depictions.

This is a difficult request: you will only have 4 seconds with each Name before the scale appears, which you have a second to respond to. All we ask is that you try your best, and keep in mind that this is just practice for the Main phase.

Do you have any questions before we start?

EVERYDAY GHOSTS

[Run ***E_Gprac***]

(After finishing the first round of practice)

At this point, in order to evaluate how you are completing the Imagination task I'll ask you a short list of questions.

[Administer diagnostic questionnaire 1]

Great! Thanks for that... The important things to keep in mind for this task are

- Keeping your focus and attention on the person/Name who is presented on the screen
- Using as much of the information as possible to create a clear picture of
 - What this person looks like,
 - How you relate to them, and
 - How you go about working closely with them in order to complete your assignment
- Using the scale (1-4) indicate whether it was easy, mostly easy, challenging, or difficult to interact with the person whose name was displayed on the screen

And that's the end of the Practice phase! Awesome work so far. How are you doing?

Main Phase

Ahead of we have the Main phase of the experiment which is just a longer sequence of the Imagination tasks you experienced in the previous practice phase.

Remember to try your best to imagine the person whose name is presented clearly with a strong mental image of them, how they behave, and what it's like to work with them on this very important assignment.

Respond as efficiently as you can with the button presses for the Imagination task.

The Main phase has several repetitions, meaning that you will complete the Imagination task with the Names more than once before the phase is completed. Along the way, since it will be a challenging task, you will be provided with the opportunity to take 6 short breaks. This will be indicated by a screen which reads- "Please, take a short break before continuing." The screen will remain like this for 30 seconds, after which you can either continue immediately (by pressing Enter when the instructions on the screen instruct you to) or take a little more time to prepare yourself before returning to the experiment.

I know this can seem a little daunting. However, so long as you're trying your best to accomplish the tasks I've described to you in the ways we've talked about, there's nothing to worry about.

Do you have any questions before we move on?

[Run ***E_Gmain***]

(Check in with the participant during their breaks to assess fatigue, etc.)

[Administer diagnostic questionnaire 2 at Break #3]

Final Phase

EVERYDAY GHOSTS

Congratulations on completing the Main phase of the experiment! I know that was a lot of work that you put in, and there's only a little bit more to go before we're done.

In this last phase of the experiment you will be tested on your memory of the original Name-Word pairs. Just as you were asked to do earlier, when presented with the Name prompt, you will be asked to provide the Word response which was paired with it by saying it aloud. Please try to respond with the associated Word for each Name that is presented on the screen and do so as quickly and accurately as possible. I will be writing down your responses and recording the audio for later verification purposes. So be sure to speak clearly.

Some of the Names in this phase will be ones that you have not seen since the initial study and practice phases, so please take a moment to think back to those earlier phases since you haven't seen those word pairs in a while.

Before we complete this final test, do you have any questions?

[Run *E_Gfinal*]

Debriefing

Thank you very much for your focus and effort throughout this process. That is the end of the experiment, and as I debrief you as to the specifics of the study I would ask that you fill out this brief survey about the study (which it is very important we hear your responses to) and a short Demographic form.

Also, here is a Debriefing form for you to hold onto for your own record.

This experiment required us to withhold information from you in order to avoid contaminating the results. In particular, we did not tell you in advance about the surprise memory test at the end of the study. Telling you up front that your memory for the words would later be tested might invalidate the hypotheses being investigated. We apologize for withholding this information about the experiment before you participated. Please let me know if it is still OK to use your data in our research.

(Can read through the rest of the Debriefing form. The above is the most significant point raised in the debriefing form, apart from thanking the participant).

End of Experiment.

Appendix F

SECTION 1)

1. **Last name:** Murphy
2. **First Name:** Sean
3. **E-mail:** sm6894@bard.edu
4. **Phone number:** 516-880-4216
5. **Academic program:** Psychology
6. **Status:** Student
7. **Name of faculty adviser/sponsor:** Justin Hulbert
8. **Adviser's/sponsor's e-mail:** jhulbert@bard.edu
9. **Today's date:** 11/07/2017

SECTION 2)

1. **I have read the IRB's Categories of Review, and my proposal qualifies for a:** Full Review
2. **Do you have external funding for this research?** No
 - a. **If so, state name of granting institution:** Not applicable
3. **Begin date:** Upon approval
4. **End date:** One year from the date of approval.
5. **Title:** Everyday Ghosts: Examining Memory Modulation in Social Interactions
6. **Research question:** How does the human memory system adjust to circumstantial pressures? Past research provides evidence for memory enhancement in moments of extreme emotional valence ("happy" or "sad" events) where the context of the emotional valence improves later ability to recall certain events. However, while certain details may be enhanced, it has also been shown that other facets of the event are not remembered as well, showing that emotional valence does not leave a "perfect picture" of the event in our minds. ¹ Additional research suggests that individuals are capable of intentionally up- and down-regulating the brain's hippocampal memory system in order to modulate the extent to which particular memories are/are not accessible. ² Such attempts have lasting consequences for the memorability of the target memories and also affect the formation of new memories for unrelated events occurring in the same general timeframe. In examining differences in memory across emotionally valent social interactions, I aim to identify the social circumstances which give rise to unintentional forgetting. Assessing how negative social interaction can motivate both direct (targeted) and indirect (based on temporal proximity) suppression in individuals (especially in those with an avoidant coping style), may lead to the development of possible techniques to better help people remember what/when they want to remember and forget what/when they want to forget.
7. **Will your participants include individuals from specific populations (e.g., children, pregnant women, prisoners, or the cognitively impaired)?** No
8. **If your participants will include individuals from specific populations, please specify the population(s) and briefly describe any special precautions you will use.** Not applicable
9. **Briefly describe how you will recruit participants (e.g., Who will approach participants? What is the source of the participants?).**
Participants (healthy adults who are free of diagnosed neurological/attentional/learning disabilities, between the ages of 18-35, and with normal/corrected-to-normal color

vision; participants must have been exposed to English regularly since early childhood/ be native English speakers) will be drawn from Bard College and surrounding communities. Participants will first partake in an online Screening Study which will determine their coping tendencies using the Coping Responses Inventory. ³ Based on their results, those who possess neutral or avoidant coping strategies will, with their permission, be contacted for future participation in the Main Experiment. Avoidant copers are defined (according to a standardized questionnaire) as individuals who more commonly engage in suppressive behavior and thus have a higher proclivity to engage in suppression techniques. Those identified as possessing a neutral coping style do not express this tendency toward suppression but also do not trend in the opposite direction toward approach coping styles which involve a preoccupation with perceived obstacles. In young-adult populations, the prevalence of avoidant copers is approximately 12% with the majority of young adults possessing a neutral coping style. ⁴ Recruitment materials (posters, flyers, messages distributed via electronic and physical bulletin boards/listservs, and/or advertisements placed in local online/printed periodicals, social media sites —see Appendix A) will direct interested parties to the associated link for the online Screening Study or, for the Main Experiment, to contact the principal investigator (Sean Murphy) at sm6894@bard.edu to schedule sessions and learn more about the study. My contact information will also be provided in advertisements for the Screening Study should potential participants seek more information.

On first contact, participants will be asked to confirm their eligibility for the particular study in question and their desire to participate. Following this, they would have the opportunity to schedule an appointment. Upon arrival at their scheduled appointment, participants will go through the informed consent process (see Appendix B for example language used in these materials). Participants will be compensated for their participation in the Screening Study with the chance to win an Amazon gift card valued at \$50, and those in the Main Experiment will be compensated with the chance to win an Amazon gift card valued at \$100.

10. Briefly describe the procedures you will be using to conduct your research. Include descriptions of what tasks your participants will be asked to do, and about how much time will be expected of each individual. NOTE: If you have supporting materials (recruitment posters, printed surveys, etc.) please email these documents separately as attachments to IRB@bard.edu. Name your attachments with your last name and a brief description (e.g., "WatsonConsentForm.doc").

This procedure is broken down into two parts: a Screening Study which determines participant coping mechanisms and the Main Experiment. The Screening Study will be conducted via a web survey (surveygizmo.com) to administer the Coping Responses Inventory (; see Appendix F for reference) while the Main Experiment will be conducted on campus during a scheduled appointment. The Screening Study and Main Experiment will be described as unrelated to the participants until the debriefing process of the Main Experiment.

a. Behavioral Procedures

- i. In both the Main Experiment and the Screening Study, tasks involve the presentation of words, images, or sounds via computer. Subjects will be asked to study, retrieve, and/or make simple judgments about particular

stimuli when prompted. The Screening Study will involve the presentation of mildly stressful scenarios coupled with statements of related response which the participant agrees or disagrees with (see Appendix C for more detail).

The Main Experiment will first involve the memorization of NAME-WORD pairs followed by an affirmation of memorability of these pairs (what word was presented with *Nancy*?). The participant will then listen to audio narratives which imbue affective valence onto the NAME-WORD pairs. This is followed by the main task which differs based on condition. In the “bystander” condition, the participant will be presented with NAMES which were previously presented in the context of pairs (*Nancy*) and instructed to perform a thought exercise with them. Alongside these NAME tasks will be additional tasks. Participants are told that the other tasks are distracting both to keep in line with the pretense of the study of attention as well as to prevent any suspicion that the distractor items will be part of a later memory test. For one of these tasks (the Odd/Even judgment) the participant will be asked to complete a low-level baseline task (deciding whether a series of digits is even or odd using a key press) before and after each “bystander” that is presented. This low-level baseline task is designed to control for task-switching costs. For the Photo distractor task the participants are presented with a photo composed of an object within a distinctive setting/background. They are instructed to imagine how that object appeared in that particular setting and rate the difficulty they had with this task on a scale from 1-4. These photos are the “bystander” objects on which participants will later be tested at the end of the experiment.

Please see Appendix C for examples of these tasks and a layout of the experiment.

Responses for the final memory tests will be spoken (into a microphone for online coding of recorded responses or directed at the experimenter for offline coding) or manual (e.g., button presses or mouse moves), allowing for the assessment of reaction time and/or accuracy measures.

Participants may receive audio/visual feedback concerning their responses (e.g., a visual color change of the text to indicate that the response was recorded). Immediately at the end of the experiment participants’ memory for certain stimuli will be tested through first one cued-recall test (e.g., “what was featured in this picture before that is not featured now?”) and then a second test (e.g., “what was paired with this name?”). Participants will be told that they should respond as accurately as possible within the allowed time, but that they should relax and not worry about any mistakes that they may make. Detailed instructions and practice with the tasks will insure that participants will not be confused about what to do throughout each phase of the experiment.

The Main Experiment will involve the use of emotionally valent stimuli to study suppression in both positive and negative contexts. For this reason, both happy and uplifting materials (“Thank you so much for helping me

find my button yesterday! It was really nice of you!”) as well as more stressful stimulus materials (“Hey, that new jacket of yours looks like complete trash, especially on someone like you. See you.” see Appendix C for additional example stimuli). These stimuli will be delivered audibly via pre-recorded narratives. The words incorporated into both the positively valent and negatively valent stimuli include words selected from the Affective Norms for English Words (ANEW) database, ⁵ a composition of words from the English language which are scored according to valence, arousal, and dominance. These scores have been normed and the database has been widely cited and used in psychological research.

To safeguard against any excessive discomfort for the participant in these situations, the participants will be told before they come into the lab that emotional stimuli will be used in the experiment and that certain stimuli are designed to be unpleasant. The consent forms also details these potential risks, full versions of the which are provided in Appendix B. As part of the informed consent process, the nature and format of the stimuli will be described to the participant and they will be reassured that if they do decide to take part in the experiment they may end the experiment at any point.

To minimize fatigue, discomfort or eyestrain, subjects will be offered one or more rest periods during a session, sessions lasting between 1.5-2.0 hours. During the rest periods, participants may stretch and/or close their eyes and rest for as long as they wish. Both the Screening Study and the Main Experiment will each consist single testing sessions which is concluded by the end of the session.

At the end of the experiment, participants will be asked about their experience in the experiment (see Appendix D for example post-experiment questionnaire). They will then be given a debriefing sheet that describes the hypothesis being tested and the logic of the experiment (i.e., how does the experiment test this hypothesis), and the experimenter will answer any questions that the subject might have. I have included an example debriefing form with this application as part of Appendix E. Participants will be asked not to discuss the specifics of the experiment with other potential participants, so as to ensure that they would experience it in the same way.

After the end of data collection the participants of the Screening Study will be randomly assigned a sequential number id (1, 2, 3, etc.) corresponding to their name/contact information (not alphabetized). Through the use of a random number generator one of the numbers will be selected, this being the winner of the raffle for the \$50 Amazon gift card. The same process will be used for the participants of the Main Experiment to determine the winner of the \$100 Amazon gift card. The raffle for the Main Experiment does include the participants of the Screening Study.

Once the winners of the raffles have been determined, the respective winners will be contacted using the email addresses they have provided. A convenient time can then be scheduled for the winner to collect their gift card from the secure location where it has been stored.

11. Approximately how many individuals do you expect to participate in your study? The Screening Study will require around 100 valid participants to ensure a large sample for later recruitment of individuals with neutral coping tendencies and individuals with avoidant coping tendencies into the Main Experiment. Depending on counterbalancing factors, the level of noise, and statistical power, for the Main Experiment I expect to need approximately 24 valid participants.

12. Please describe any risks and benefits your research may have for your participants. (For example, one study's risks might include minor emotional discomfort and eyestrain. The same study's benefits might include satisfaction from contributing to scientific knowledge and greater self-awareness.)

a. This protocol presents minimal risk for participants. The narrative stimuli used in this experiment are not designed to be any more stressful than negative encounters that may be experienced in everyday settings. To safeguard against any excessive discomfort for the participant in these situations, the participants will be told before they come into the lab that emotional stimuli will be used in the experiment. As part of the informed consent process, they will receive a description of the scenarios portrayed in the narratives and, with their permission, they will be able to read a representative narrative like those used in the experiment. Participants would then be reassured that if they do decide to take part in the experiment they may end the experiment at any point without fear of consequence. In every case, a thorough debriefing will be provided, along with information (also provided in the consent form; see Appendix B) about how to get in touch with the Bard Counseling Center and relevant help services for non-students. While prior work suggests that few participants will prefer to opt out, we anticipate that those who do are largely willing and able to state their preference to opt out before even beginning the experiment (e.g., at the recruitment stage or during the consent process), minimizing any risk of unwelcome discomfort. We make every effort to reduce the possible fatigue that may arise from performing a cognitive task for the duration of the session by including regular breaks.

b. While there are no direct benefits to participants, participants may benefit from learning about the research process (especially true for Bard psychology students), as well as about the background motivating the present work. Specifically, their experience and the provided debriefing information may help them identify strategies that benefit their ability to flexibly control their attention and memory systems to better meet their goals. Moreover, it is hoped that participants will experience satisfaction for having contributed to the growing scientific body of knowledge emanating from Bard. On a societal level, the present research promises to help us understand the basic mechanisms of memory and attention in social settings. To the extent that we understand such basic cognitive processes, we are in a better position to design new instructional

and learning technologies and methodologies to foster learning in both healthy and learning-impaired populations.

13. Have you prepared a consent form and emailed it as an attachment to IRB@bard.edu? Yes, the consent forms are included in this pdf

(Murphy_EverydayGhosts_IRBProposal) and may be found in Appendix B.

14. Please include here the verbal description of the consent process (how you will explain the consent form and the consent process to your participants):

a. Screening Study

Potential participants will be told that the study is investigating trends in behavior in different aspects of life—specifically, how they tend to respond in situations of mild stress. They'll be informed via the online instructions that they will be provided with all the necessary instructions at each part of the survey, as well as a full debriefing after the survey is completed. After confirming that they are eligible for the experiment (accomplished by checking off a response box) the participant will then proceed directly to an instructional page which details the full series of tasks involved in the survey. As the situations presented are of mildly stressful in nature, a representative example of the stimuli will be provided for the participant to gauge whether they would feel comfortable being exposed to that type of stimuli during the course of the survey. Irrespective of their participation, participants will be told that they are welcome to ask questions about the research after the conclusion of the survey pointed to the additional contact information provided on the consent/debriefing forms.

b. Main Experiment

Potential participants will be told that the study is investigating their ability to pay attention—specifically, their ability to attend to novel interactions despite distracting material. They'll be informed that the experimenter will provide them with all the necessary instructions and walk them through each step of the experiment, as well as a full debriefing after the experiment is over. After confirming that they are eligible for the experiment, the experimenter will then provide a brief oral description of the tasks they'll be asked to perform during the experiment. As the stimuli are of an emotional nature, individuals will be informed of this, asked whether they would mind a description of the stimuli, and—if they agree—provided a representative, detailed summary of the themes of the stimuli to gauge whether they would feel comfortable being exposed to that type of stimuli during the course of the experiment. Should they indicate their willingness to participate, all participants will be provided a written informed consent agreement that describes the study in more detail. They will then be asked to repeat back, in their own words, the procedure laid out in the consent form and to verbally answer a set of basic questions establishing their understanding and their right to withdraw from the study at any point without penalty. Provided all parties reach a common understanding, the participant will be invited to sign the consent agreement. All participants will be told that they are welcome to ask questions about the experiment both before and after the experimental session and pointed to the additional contact information provided on the consent/debriefing forms.

15. If your project will require that you use only a verbal consent process (no written consent forms), please describe why this process is necessary, how

verbal consent will be obtained, and any additional precautions you will take to ensure the confidentiality of your participants. Not applicable

16. What procedures will you use to ensure that the information your participants provide will remain confidential? All of the data collected in this study will be coded in an unidentifiable manner (using only an arbitrary number string to identify linked data) and kept strictly confidential. Email addresses (collected to contact participants should they be eligible for the Main Experiment and to enter themselves into the raffle) will be kept separately from survey responses and core data from the main experiment. They, too, will only be linked by an arbitrary string of numbers, with the linking document stored separately on a password-protected computer maintained by the research group. Individually identifiable data will not be released to anyone outside the research laboratory without the written consent of the participant. The Screening Study will be conducted via a third party website (surveygizmo.com), which takes extensive measures to ensure the privacy of the data recorded and does allow for anonymous participation. The consent form for the Screening Study will explain to participants that the information collected through the survey will be temporarily stored on SurveyGizmo servers; however, once data collection has concluded (expected to be by May 1st) the data stored there will be downloaded and stored securely on private computers and deleted from the SurveyGizmo account. At the end of the survey the participants will be asked:

- 1) Would you be interested in being contacted about your eligibility for future psychology studies at Bard? Yes/No.
- 2) If Yes, please provide your email address below. This email address will also be used to enter you into the prize raffle and to contact you should you be selected as the winner of the raffle.
- 3) If No, or if you would prefer to keep your responses to this questionnaire separate from your contact information but would still like to be entered into the raffle or to be contacted about your eligibility future research opportunities please send the below completion code to sm6894@bard.edu with the subject line, "Raffle Entry," detailing the nature of your interests.

Any audio files with participant responses will similarly be stored in a secure manner within the confines of the laboratory. If any information obtained from this study is published, the article will be written so that the identity of all subjects will remain confidential. Signed consent forms will be stored separately from the data, in a locked filing cabinet accessible only to members of the research team that are certified to work with human subjects. All study materials will be coded and entered into password-protected computer files. Any publication or conference presentation stemming from the research in question would avoid the inclusion of any identifying participant information.

17. Will it be necessary to use deception with your participants at any time during this research? Please note: withholding details about the specifics of one's hypothesis does not constitute deception. However, misleading participants about the nature of the research question or about the nature of the task they will be completing does constitute deception. Yes

18. If your project study includes deception, please describe here the process you will use, why the deception is necessary, and a full description of your debriefing procedures.

a. Potential participants for the Main Experiment will be told that the study in which they are participating is investigating their ability to focus their attention—specifically, their ability to concentrate on something intensively and ignore distracting things. While the stated interest in the control over attention is true, this experiment involves withholding additional information in order to test the main hypothesis about the consequences of such control over memory. In particular, participants will not be told at the outset that their memory will be tested at the end of the experiment. Moreover, the experimenters may implicitly or explicitly indicate that there will not be a final memory test. Many of the forms of learning and memory to be investigated are incidental, such that participants learn without trying or even being aware that learning is happening. This aspect of the research is critical, since explicitly trying to learn/memorize is a very different process than the one being investigated here. In fact, past research has shown that trying to learn can interfere with incidental forms of learning. Therefore, telling participants up front that they will be tested would invalidate some of the hypotheses being investigated. When possible, participants will be given partial information that there will be a subsequent part of the experiment involving a different task and that they'll be given new instructions at that point. In all experiments, participants will be fully debriefed about the stages of the experiment, the full hypotheses being tested, and how the different tasks help address these hypotheses (see below). Furthermore, participants will be given the opportunity during the debriefing session to withdraw their consent. Should they wish it, we will discard their data as requested. This minor withholding of information does not expose participants to any additional risks.

b. After completing the experiment, participants will be asked a few general questions (see the full post-experimental questionnaire in Appendix D). These questions will help assess whether the experiment[er] met their expectations, whether the instructions had been sufficiently clear, and that they had a positive overall experience. They will then be given a debriefing sheet that describes, in detail, the full set of hypotheses being addressed, how the experiment addresses these hypotheses, the broader significance of the research, and how to get in touch with the relevant party should they have any further questions or concerns. The experimenter will answer any questions that the participant might have. A sample debriefing sheet is attached as Appendix E. The debriefing will include the following statement regarding the surprise memory test: “This experiment required us to withhold information from you to avoid contaminating the hypothesis. In particular, we did not tell you in advance about the memory test at the end of the study. Intentionally trying to learn is a very different process than the learning that incidentally occurs when you perform a task. In fact, past research has shown that trying to learn can interfere with more incidental forms of learning. Therefore, telling you up-front that you would be tested could invalidate the hypotheses being investigated. We apologize for withholding this information about the experiment before you participated. Please let your researcher know if we may still use your data in our study.” If the participant indicates “no” at this point, we will discard their data (but they will still be fully compensated for their participation). Regardless, all participants will be thanked

and be compensated according to the format established during the intake process. Participants will also be asked not to discuss the specifics of the experiment with other potential participants, so as to ensure that they would experience it in the same way.

19. For projects not using deception, please include your debriefing statement. (This is information you provide to the participant at the end of your study to explain your research question more fully than you may have been able to do at the beginning of the study.) All studies must include a debriefing statement. Be sure to give participants the opportunity to ask any additional questions they may have about the study. See Appendix E for a sample debriefing statement.

SECTION 3)

- 1. If you will be conducting interviews in a language other than English, will you conduct all of the interviews yourself, or will you have the assistance of a translator?** Not applicable
- 2. If you will be using the assistance of a translator, that individual must also certify that he or she is familiar with human subject protocol and has completed the online training course. Please respond whether you have found an IRB-certified translator.** Not applicable
- 3. If you have not yet found a translator, do you agree that when you do find a translator, you will make sure that person will also agree to use standard protocol for the treatment of human subjects, and that the individual's training certificate will be submitted to the IRB records before you begin collecting data?** Not applicable
- 4. If your recruitment materials or consent forms will be presented in languages other than English, please translate these documents and email copies at attachments to IRB@bard.edu.** Not applicable
- 5. I have submitted all my translated materials.** Not applicable
- 6. I have submitted a copy of my video consent form.** Not applicable

SECTION 4)

1. **If you are a graduate or undergraduate student, has your adviser seen and approved your application? Yes.**

a. **If you have not already done so, you must ask your adviser to email a statement on your behalf to IRB@bard.edu The statement should read, "I have reviewed [your name]'s proposal and I will oversee this research in its entirety."** My adviser has sent a statement on my behalf to the indicated email address indicating the fact that he has reviewed this proposal and will oversee the remainder of the research process.

2. **Please read the following statement carefully: "I have read the Bard IRB policy on the treatment of human research participants. I will comply with the informed consent requirement, and I will inform the IRB if significant changes are made in the proposed study. I certify that all of the information contained in this proposal is truthful." Submitting this form means that you affirm the statement above and will comply with the content. This counts as your legally binding signature.**

I concur with the above,

A handwritten signature in black ink that reads "Sean P. Murphy". The signature is written in a cursive style with a large, decorative flourish at the end.

Sean P. Murphy

Appendices (IRB)

Appendix A: Sample recruitment text

- Screening Study
- Main Experiment

Appendix B: Consent forms

- Screening Study
- Main Experiment

Appendix C: Example stimuli & methods overview

- Screening Study
- Main Experiment

Appendix D: Sample post-experiment questionnaire

Appendix E: Debriefing form

- Screening Study
- Main Experiment

Appendix F: References

Appendix G: NIH Human Participant Protection Education Certificate

Appendix A (IRB)

a) **Sample recruitment text for:** Screening Study

Subject: How do you react?!? Participate in a short study exploring behavior in various situations.

Body copy: People react in various ways to the same scenario, but often in patterns that can be studied for better understanding. I am a senior project student from the Psychology Program at Bard College interested in learning more about how the population at Bard may trend in these behavioral reactions compared to the wider population. We encourage you to help! Your participation in an online survey will take at most 10-15 minutes. In exchange for your participation you would have a chance to win one Amazon gift card worth \$50!

To be eligible, you must:

- Be 18-35 years of age
- Have normal/corrected-to-normal (glasses/contacts are OK) color vision
- Have been exposed to English regularly since early childhood (or otherwise are a native English speaker) to the level of a fluent speaker
- NOT have a diagnosed attention deficit, learning disability, or neurological condition

If interested, please follow this link to begin the survey:

(link to be provided)

You are also free to email sm6894@bard.edu for more information about this study or the process of participation.

Thank you for your consideration!

b) Sample recruitment text for: Main Experiment

Subject: Are you listening? Participate in a psychology experiment on attention and audio narratives.

Body copy: Have you ever lost the thread of a conversation or tuned out and missed the lyrics of a song? I am a senior project student from the Psychology Program at Bard College interested in learning more about healthy adults' ability to pay attention and ignore distractions. We'd like to ask for your help! Please consider participating in a computer-based attention experiment that takes place on Bard's campus and lasts 1.5-2 hours. In exchange for your participation, you would have a chance to win one Amazon gift card worth \$100!

To be eligible, you must:

- Be 18-35 years of age
 - Have normal/corrected-to-normal (glasses/contacts are OK) color vision
 - Have been exposed to English regularly since early childhood (or otherwise are a native English speaker) to the level of a fluent speaker
 - NOT have a diagnosed attention deficit, learning disability, or neurological condition
- If interested, please email sm6894@bard.edu for more information about this study or to schedule an appointment.

Thank you for your consideration!

Appendix B (IRB)

a) Screening Study

BARD

A College of the Liberal Arts and Sciences

Division of Science, Math, and Computing

PO Box 5000, Annandale-on-Hudson, NY 12504-5000 Telephone: 845-758-4390

INFORMED CONSENT AGREEMENT**Study title:** Patterns of Reaction: A Survey of Behavior**Principal investigator:** Sean P. Murphy

You are being asked to take a research survey that seeks to learn about people's tendencies and behaviors when presented with certain situations. To decide whether or not you wish to participate, you should know enough about its risks and benefits to make an informed judgment. This consent form gives you information about the research study, and the experimenter will provide you with additional information about the specific questions you will be answering. Once you are ready, you will be asked if you wish to participate and, if so, you will sign the consent form. You can choose not to participate, and you can choose to end your participation at any time during the survey.

Background: In our study, we hope to learn about the basic trends in behavior and decision making in healthy adults in and around the Bard community. Decision-making processes are involved in a large array of mental functions, be it conscious decisions of what to do during the day to actions we may be less aware of, such as deciding what we like or dislike.

What you will do in this study: Should you be eligible and decide to participate, you will be asked to read about several different theoretical scenarios and answer questions about how you would feel and act if you were in that position. You will submit your responses by clicking on the check-box which corresponds to the answer you would provide. Detailed instructions will guide you through each part of the survey explain each portion of the procedure. After finishing the survey, you will be given an opportunity to submit any thoughts or questions you may have.

It is expected that this survey should take about 10-15 minutes to complete.

Should you ever decide to end your participation early, you have every right to stop taking the survey at any point. All the information and responses collected during the survey will be deleted in such a case.

Risks and benefits: There are no health risks associated with this study and most participants report having a positive experience. Some of the scenarios may involve minimal discomfort, such as imagining a trip to the doctor or having an unexpected essay to write due tomorrow.

This survey is conducted through a third party (surveygizmo.com) and responses to the survey will be temporarily stored on SurveyGizmo servers; however, once data collection has concluded (expected to be by May 1st) the data stored there will be downloaded and stored securely on private computers and deleted from the SurveyGizmo account. While participants will have the opportunity to provide their contact information at the end of the survey (to enter the prize raffle and, should they want, to be contacted for future studies for which they may be eligible), should

EVERYDAY GHOSTS

participants wish for their survey responses to remain entirely separate from their contact information, they will be provided with an alternative means to enter the raffle. While this survey may not provide participants with any direct benefits, the data collected from this study may help improve the scientific understanding of how various individuals behave in different settings and lead to a better understanding of which patterns of behavior are most prevalent.

Compensation: In exchange for participating in this survey, participants will be entered into a lottery and have a chance to win a \$50 dollar Amazon gift card. Participants may either provide their own email address in order to be contacted about the raffle or, if they prefer to keep their contact information separate from the responses to the survey, may contact the principal investigator (Sean Murphy) separately. Participants will not have to decide on this until after they have completed the survey. Upon completing the survey, explicit instructions will be provided explaining how to complete either option for communication.

Your rights as a participant: Your participation in this survey is completely voluntary, and you may withdraw from the experiment at any time without penalty. You may withdraw by exiting the survey site, effectively terminating your involvement. More information about the overall study and will be provided at the end of the survey. If you wish, you can send an email message to the principal investigator, Sean Murphy (sm6894@bard.edu), and he will send you a copy of any manuscripts based on the research (or a summary of the results without any identifying information about participants).

Confidentiality: All records from this study will be kept confidential. Participant responses will be assigned an arbitrary number and kept strictly private, shared only with members of the trained research group. This group may be composed of both faculty and undergraduate researchers. We will not include any information that will make it possible to identify participants in any report we might publish. Research records will be stored securely in a locked cabinet and/or on password-protected computers. Responses to the survey will be temporarily stored on SurveyGizmo servers; however, once data collection has concluded (expected to be by May 1st) the data stored there will be downloaded and stored securely on private computers and deleted from the SurveyGizmo account. The research team will be the only party that will have access to participant data. We will not include any information that would make it possible to identify participants in any report we might publish, including the resulting Senior Project which will be accessible publicly at Bard College's Stevenson Library and on the online thesis repository, the Digital Commons.

If you have questions about this study, please ask your researcher or contact Sean Murphy, Psychology Program, Bard College, Annandale-on-Hudson, NY 12504, sm6894@bard.edu. You may also contact faculty advisor for this research, Justin Hulbert, at jhulbert@bard.edu. If you have questions about your rights as a research participant, please contact the Bard College Institutional Review Board at irb@bard.edu.

STATEMENT OF CONSENT:

"The purpose of this study, procedures to be followed, and the risks and benefits have been explained to me. I have been given an opportunity to ask questions, and my questions have been answered to my satisfaction. I have been told whom to contact if I have additional questions. I have read this consent form and agree

EVERYDAY GHOSTS

to be in this study, with the understanding that I may withdraw at any time."

By checking the box below in place of my signature, I agree with the above statement of consent and further certify that I am at least 18 years of age.

By clicking [Yes] to proceed to the survey, you are agreeing to the above statement of consent. [Yes] [No]

EVERYDAY GHOSTS

b) Main Experiment

BARD

A College of the Liberal Arts and Sciences

Division of Science, Math, and Computing

PO Box 5000, Annandale-on-Hudson, NY 12504-5000 Telephone: 845-758-4390

INFORMED CONSENT AGREEMENT**Protocol number:** _____ **Expires:** _____**Study title:** Everyday Ghosts: Examining Attention in Social Interactions**Principal investigator:** Sean P. Murphy

You are being asked to take part in a research experiment at Bard College that seeks to learn about people's ability to pay attention and ignore distracting things.

To decide whether or not you wish to participate, you should know enough about its risks and benefits to make an informed judgment. This consent form gives you information about the research study, and the experimenter will provide you with additional information about the specific tasks that you will be performing. Once you are ready, you will be asked if you wish to participate and, if so, you will sign the consent form. You can choose not to participate, and you can choose to end your participation at any time during the study.

Background: In our study, we hope to learn about the basic mechanisms underlying human cognition and attention in healthy adults. Attention refers to your ability to concentrate on some things intensively, while ignoring other things that are potentially distracting.

What you will do in this study: Should you be eligible and decide to participate, you will be asked to pay attention to written (words), visual (images), and auditory materials (sounds) presented by a computer while ignoring distractions, and we are going to assess how effectively you can do this. In doing so, you may be asked to make simple judgments about these materials by pressing buttons, moving a mouse, or speaking out loud into a microphone that will capture your responses. The researcher will offer detailed instructions to guide you through each part of the experiment and answer any questions you may have about the procedure. After the experiment, you will then be asked to fill in a brief questionnaire about the experiment and given an opportunity to ask any remaining questions that you may have.

It is expected that any single experiment session will take between .75 hour and 2 hours. Participants will be offered the opportunity to take breaks throughout. Should you ever decide to end your participation early, you are encouraged to simply let the experimenter know. All the information and responses collected during the experiment will be deleted in such a case.

Risks and benefits: There are no health risks associated with this study and most participants report having a positive experience. Experiment sessions are kept as short as possible, and every attempt is made to ensure that participants are kept comfortable throughout. Participants should be reminded that, should they become fatigued or in any way uncomfortable during the experiment, they may withdraw at any time without penalty.

In some cases, the words, images, and sounds participants may encounter during the experiment are intended to be negative, threatening, and offensive. Such recordings

EVERYDAY GHOSTS

involve instances where the speaker in the audio recording might be considered exasperated, mildly insulting, or curt. These negative stimuli are essential for the study of attention across different types of social interaction. If you find yourself getting disturbed or upset and you want to end your participation in the experiment at any point, you have the right to do so. Just tell your experimenter, "I want to stop," and you will be free to leave without penalty.

If you are a student at Bard College and find that any aspect of the experiment caused you distress, you are encouraged to contact the Bard Counseling Center at 845-758-7433 during normal business hours or at 845-758-7777 after hours or on weekends. If you are not a Bard College student but find yourself experiencing significant distress, please contact the National Suicide Prevention Hotline at 1-800-273-8255.

While this research experiment may not provide participants with any direct benefits, the data collected from this study may help improve the scientific understanding of how to effectively control the focus of attention and the results of doing so in social settings. Moreover, the researchers hope that participants gain insight into the research process at Bard College through their involvement with this work.

Compensation: In exchange for participating in this experiment, you will be entered into a lottery and have a chance to win a \$100 dollar Amazon gift card.

Participants may either provide their own email address in order to be contacted about the raffle or, if they prefer to keep their contact information separate from the responses to the experiment, may contact the principal investigator (Sean Murphy) separately. Participants will not have to decide on this until after they have completed the experiment. Upon completing the survey, explicit instructions will be provided explaining how to complete either option for communication.

Your rights as a participant: Your participation in this experiment is completely voluntary, and you may withdraw from the experiment at any time without penalty. You will still receive compensation for participating. You may withdraw by informing the experimenter that you no longer wish to participate.

The experimenter will tell you more about the study and our hypotheses at the end of the session. If you wish, you can send an email message to the principal investigator, Sean Murphy (sm6894@bard.edu), and he will send you a copy of any manuscripts based on the research (or a summary of the results without any identifying information about participants).

Confidentiality: All records from this study will be kept confidential. Your responses will be assigned an arbitrary participant number and kept strictly private, shared only with members of the trained research group. This group may be composed of both faculty and undergraduate researchers. We will not include any information that will make it possible to identify you in any report we might publish. Research records will be stored securely in a locked cabinet and/or on password-protected computers. The research team will be the only party that will have access to your data. We will not include any information that would make it possible to identify you in any report we might publish, including the resulting Senior Project which will be accessible publicly at Bard College's Stevenson Library and on the online thesis repository, the Digital Commons.

If you have questions about this study, please ask your researcher or contact Sean Murphy, Psychology Program, Bard College, Annandale-on-Hudson, NY 12504,

EVERYDAY GHOSTS

sm6894@bard.edu. You may also contact faculty advisor for this research, Justin Hulbert, at jhulbert@bard.edu. If you have questions about your rights as a research participant, please contact the Bard College Institutional Review Board at irb@bard.edu.

STATEMENT OF CONSENT:

"The purpose of this study, procedures to be followed, and the risks and benefits have been explained to me. I have been given an opportunity to ask questions, and my questions have been answered to my satisfaction. I have been told whom to contact if I have additional questions. I have read this consent form and agree to be in this study, with the understanding that I may withdraw at any time."

By signing below, I agree with the above statement of consent and further certify that I am at least 18 years of age.

Participant signature

Date

Participant name (printed)

Experimenter signature

Appendix C (IRB)

Sample behavioral methods and stimuli for: Screening Study ^{3,6,7}

The survey will present participants with general coping statements which they will identify with based on a 5-point scale (0- I do not do this at all, through to 4- I do this very often). Instructions for the participant (*Using the responses provided, select the one response which best represents how often you use the listed strategy when handling problems*) will be provided at the top of each page, below which will be the coping statement and responses for the question at hand. Once the answer has been recorded, the participant may progress to the next item, and so on for items 1 through 24.

Here is an example format for the Coping Response Inventory:

Coping Response Inventory (CRI)

INSTRUCTIONS: The following statements describe ways that you may handle difficult or stressful events in your life. There are lots of ways to try to deal with stress. This questionnaire asks you to indicate what you generally do when you experience stressful events.

For each item below, please indicate how much you generally use the strategy described to deal with difficult or stressful events.

1. Tell yourself things to make yourself feel better.
 - 0 I do not do this at all.
 - 1 I do this a little bit.
 - 2 I do this a moderate amount.
 - 3 I do this fairly often.
 - 4 I do this very often.
2. Remind yourself how much worse things could be.
 - 0 I do not do this at all.
 - 1 I do this a little bit.
 - 2 I do this a moderate amount.
 - 3 I do this fairly often.
 - 4 I do this very often.
3. Try to see the good side of the situation.
 - 0 I do not do this at all.
 - 1 I do this a little bit.
 - 2 I do this a moderate amount.
 - 3 I do this fairly often.
 - 4 I do this very often.
4. Think about how you are much better off than other people with a similar problem(s).
 - 0 I do not do this at all.
 - 1 I do this a little bit.
 - 2 I do this a moderate amount.

EVERYDAY GHOSTS

- 3 I do this fairly often.
- 4 I do this very often.
- 5. Try to tell yourself that things will get better.
 - 0 I do not do this at all.
 - 1 I do this a little bit.
 - 2 I do this a moderate amount.
 - 3 I do this fairly often.
 - 4 I do this very often.
- 6. Think about how this event could change your life in a positive way.
 - 0 I do not do this at all.
 - 1 I do this a little bit.
 - 2 I do this a moderate amount.
 - 3 I do this fairly often.
 - 4 I do this very often.
- 7. Make a plan of action and follow it.
 - 0 I do not do this at all.
 - 1 I do this a little bit.
 - 2 I do this a moderate amount.
 - 3 I do this fairly often.
 - 4 I do this very often.
- 8. Know what has to be done and try hard to make things work.
 - 0 I do not do this at all.
 - 1 I do this a little bit.
 - 2 I do this a moderate amount.
 - 3 I do this fairly often.
 - 4 I do this very often.
- 9. Decide what you want and try hard to get it.
 - 0 I do not do this at all.
 - 1 I do this a little bit.
 - 2 I do this a moderate amount.
 - 3 I do this fairly often.
 - 4 I do this very often.
- 10. Try at least two different ways to solve the problem(s).
 - 0 I do not do this at all.
 - 1 I do this a little bit.
 - 2 I do this a moderate amount.
 - 3 I do this fairly often.
 - 4 I do this very often.
- 11. Try to learn to do more things on your own.
 - 0 I do not do this at all.
 - 1 I do this a little bit.
 - 2 I do this a moderate amount.
 - 3 I do this fairly often.
 - 4 I do this very often.
- 12. Take things a day at a time, one step at a time.
 - 0 I do not do this at all.
 - 1 I do this a little bit.

EVERYDAY GHOSTS

- 2 I do this a moderate amount.
 - 3 I do this fairly often.
 - 4 I do this very often.
13. Try to forget about the whole thing.
- 0 I do not do this at all.
 - 1 I do this a little bit.
 - 2 I do this a moderate amount.
 - 3 I do this fairly often.
 - 4 I do this very often.
14. Try not to think about the problem(s).
- 0 I do not do this at all.
 - 1 I do this a little bit.
 - 2 I do this a moderate amount.
 - 3 I do this fairly often.
 - 4 I do this very often.
15. Daydream or imagine a better time or place than the one you are in.
- 0 I do not do this at all.
 - 1 I do this a little bit.
 - 2 I do this a moderate amount.
 - 3 I do this fairly often.
 - 4 I do this very often.
16. Try to put off thinking about the problem(s), even though you know you will have to at some point.
- 0 I do not do this at all.
 - 1 I do this a little bit.
 - 2 I do this a moderate amount.
 - 3 I do this fairly often.
 - 4 I do this very often.
17. Wish the problem(s) will go away or somehow be over with.
- 0 I do not do this at all.
 - 1 I do this a little bit.
 - 2 I do this a moderate amount.
 - 3 I do this fairly often.
 - 4 I do this very often.
18. Try to deny how serious the problem(s) really is/are.
- 0 I do not do this at all.
 - 1 I do this a little bit.
 - 2 I do this a moderate amount.
 - 3 I do this fairly often.
 - 4 I do this very often.
19. Take it out on other people when you feel angry or depressed.
- 0 I do not do this at all.
 - 1 I do this a little bit.
 - 2 I do this a moderate amount.
 - 3 I do this fairly often.
 - 4 I do this very often.

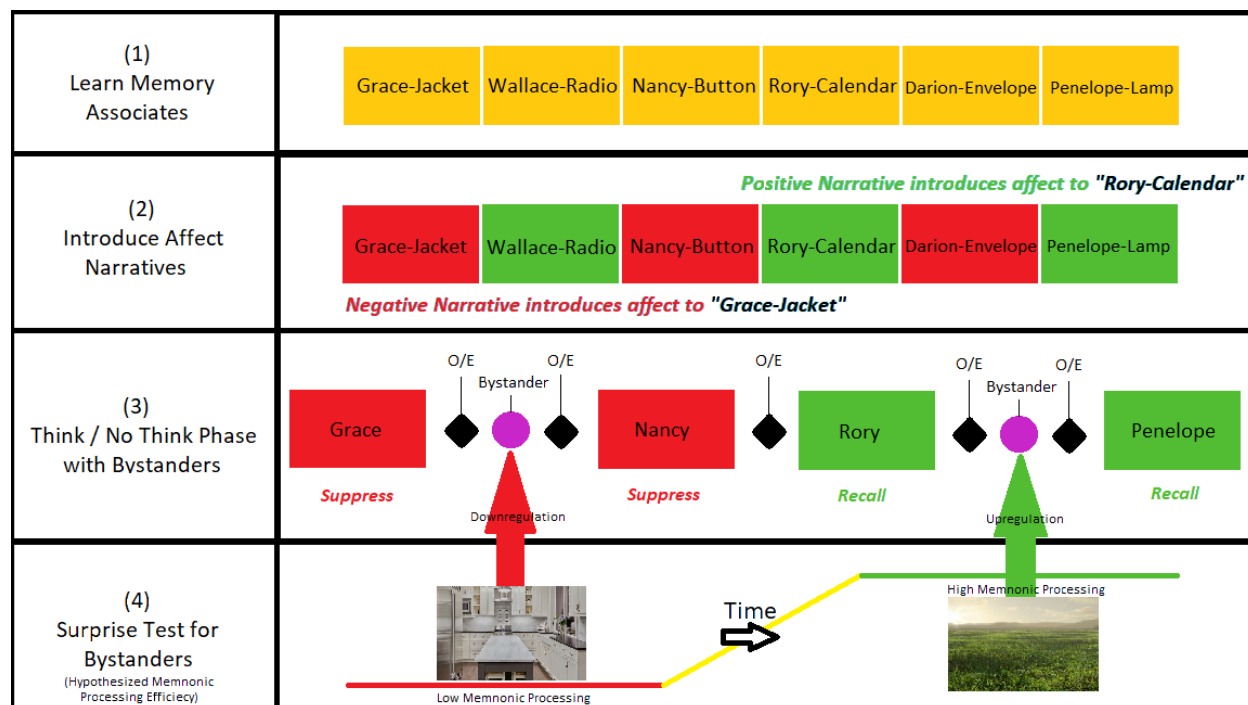
EVERYDAY GHOSTS

20. Take a chance and do something risky.
- 0 I do not do this at all.
 - 1 I do this a little bit.
 - 2 I do this a moderate amount.
 - 3 I do this fairly often.
 - 4 I do this very often.
21. Keep away from people in general.
- 0 I do not do this at all.
 - 1 I do this a little bit.
 - 2 I do this a moderate amount.
 - 3 I do this fairly often.
 - 4 I do this very often.
22. Yell or shout to let off steam.
- 0 I do not do this at all.
 - 1 I do this a little bit.
 - 2 I do this a moderate amount.
 - 3 I do this fairly often.
 - 4 I do this very often.
23. Cry to let your feelings out.
- 0 I do not do this at all.
 - 1 I do this a little bit.
 - 2 I do this a moderate amount.
 - 3 I do this fairly often.
 - 4 I do this very often.
24. Do something that you don't think will work just for the sake of doing something.
- 0 I do not do this at all.
 - 1 I do this a little bit.
 - 2 I do this a moderate amount.
 - 3 I do this fairly often.
 - 4 I do this very often.

EVERYDAY GHOSTS

Sample behavioral methods and stimuli for: Main Experiment

(a) Overview of typical procedure and predictions, with example stimuli

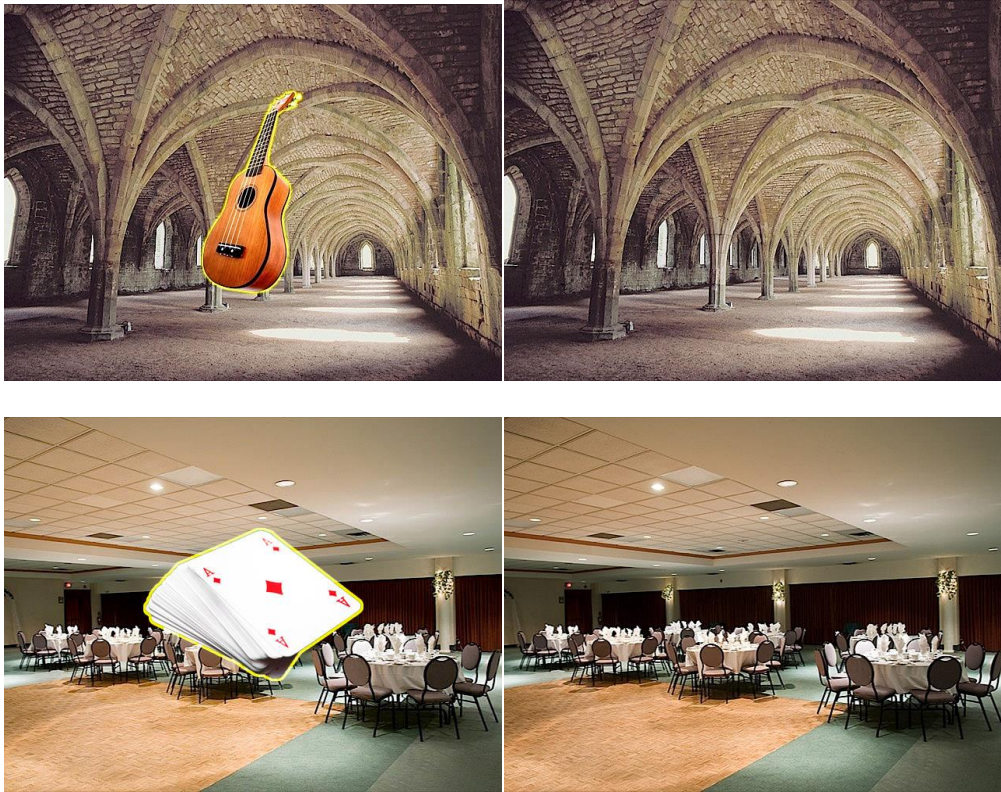


After studying NAME-WORD pairs (Phase 1), participants listen to positive narratives for half of the NAME-WORD pairs and negative narratives for the remaining pairs (Phase 2). These audio narratives include the response word in the NAME-WORD pairs while the associated name is presented visually.

Participants then perform trials wherein they are presented with the names from the NAME-WORD pairs and imagine a novel interaction with the person attached to that name. For participants who receive bystanders in between a subset of the NAME cues, inserted between these trials are novel “bystander” photos that participants encode by silently answering the question, “Why is the pictured object in this location?” More representative examples of the bystander photos are provided below (Appendix C, Subsection b). Odd/Even buffer judgments performed before and after bystanders match the immediate task context across positive and negative reminder trials (collectively, Phase 3). Both the bystander photo task and the Odd/Even Judgments are presented as “distractor tasks”. Those in the non-bystander condition will not be presented with bystander photos. The line graph illustrates the predicted mnemonic processing efficiency during the above events. Of interest is whether surrounding bystanders with suppression trials affects later memory for bystander pictures, causing a brief interlude of amnesia. This is assessed in Phase 4, in which the participant must recall the associated object for each context scene. Not displayed is the additional cued-response test in which the participants are presented with the name from the earlier NAME-WORD pairs and are asked to provide the word which corresponds to it.

EVERYDAY GHOSTS

(b) Example Bystander pictures.



Prompt: “What object did you previously see in this location?”

The image on the left is an example of a bystander that is presented in the main phase of the experiment (phase 3 in the above diagram). The right hand image is the background image used to test the participant’s memory of the central object in the surprise recall test for the bystander photos.

(c) Text for negative and positive narratives (respectively).

Positive Narrative, Example #1) Name Visually Presented: *Grace*

“Hi there, I wanted to let you know that your new jacket looks really great on you! See you soon!”

Positive Narrative, Example #2) Name Visually Presented: *Wallace*

“Hey, I was wondering if you would speak on my radio program. I think you’d have a lot of interesting things to say.”

Positive Narrative, Example #3) Name Visually Presented: *Nancy*

“Thank you so much for helping me find my button yesterday! It was really nice of you!”

Negative Narrative, Example #1) Name Visually Presented: *Grace*

EVERYDAY GHOSTS

“Hey, that new jacket of yours looks like complete trash, especially on someone like you. See you.”

Negative Narrative, Example #2) Name Visually Presented: *Wallace*

“I want you to stop coming to speak on my radio program. You sound like an utter idiot, and I’m tired of it.”

Negative Narrative, Example #3) Name Visually Presented: *Nancy*

“Stay away from me, creep. Yesterday I saw you pick up my button, but I wish you’d kept your gross hands off it.”

*The narratives are designed to use the NAME-WORD pairs in either positive or negative context as part of the counterbalancing design of the study.

Appendix D (IRB)

Example Post-Experiment Questionnaire

Subject ID: _____

1. Please rate the extent to which the audio recordings made you feel negatively when they were concerned with negative interactions and scenarios.

a. I felt the content was negative but did not feel personally affected by the audio message.

Never 0 Rarely 1 Sometimes 2 Often 3 Always 4

b. I focused my attention on the NAME featured with each audio message for the entire duration.

Never 0 Rarely 1 Sometimes 2 Often 3 Always 4

c. When the audio message became too negative I focused my thoughts or attention on something else.

Never 0 Rarely 1 Sometimes 2 Often 3 Always 4

2. Please rate your approach to the main task of imagining a new interaction with the person attached to each name.

a. When the NAMES shown during the negative messages were presented I was able to tell because they reminded me of the negative feelings I experienced from those messages.

Never 0 Rarely 1 Sometimes 2 Often 3 Always 4

b. When imagining the novel interaction, I had a hard time gathering a clear image of the person whose name was presented.

Never 0 Rarely 1 Sometimes 2 Often 3 Always 4

c. In the novel interactions I imagined, I was upset with those who had said negative things in the previous messages and acted on these feelings when engaging them.

Never 0 Rarely 1 Sometimes 2 Often 3 Always 4

d. When reminded about the negative feelings produced by the messages I unintentionally or intentionally avoided thinking about the details of the messages so that I could engage in the task at hand.

Never 0 Rarely 1 Sometimes 2 Often 3 Always 4

2. Sometimes people suspect that their memory will be tested on response words for NAMES and RESPONSES later on, even though they have been told that the initial memorization was simply an exercise for the main task. Each of the following three statements is intended to measure whether you ever INTENTIONALLY made an effort to think about the WORDs for the NAMES presented the main phase (so please only consider those instances in which you purposefully thought of the response WORD, not

EVERYDAY GHOSTS

those in which a response automatically came to mind). Please make a rating for each statement and be as honest as possible with your ratings.

Never, Rarely, Sometimes, Frequently, Very Frequently

When I saw the NAME, I thought back to the WORD which went along with it.	0	1	2	3	4
---	---	---	---	---	---

After a NAME went off the screen, I only thought about the things they had said in the earlier message.	0	1	2	3	4
---	---	---	---	---	---

When I saw a NAME, I thought about the response that went with it to improve my memory for that word pair.	0	1	2	3	4
--	---	---	---	---	---

3. How often did you continue to think of the distractor tasks (or your judgments about them) into the next set of digit judgments that followed?

Never 0 Rarely 1 Sometimes 2 Often 3 Always 4

If your answer was greater than 0 (never), describe how long you continued to think about the distractor word and how the presence of the distractor item either helped or hurt your performance on the subsequent digit judgments:

4. How often did you continue to think of distractor tasks during the time when NAMES appeared?

Never 0 Rarely 1 Sometimes 2 Often 3 Always 4

If your answer was greater than 0 (never), please describe how long you continued to think about the distractor word and how the presence of the distractor item either helped or hurt your performance on the subsequent trials:

5. When you encountered a distractor task, how often did you relate that distraction to other words you saw in today's experiment either while making your decision or in the wait period after the response choices disappeared?

Never 0 Rarely 1 Sometimes 2 Often 3 Always 4

a) Please list any words that stuck out, were difficult, amusing, or otherwise memorable, describing why they were especially distinctive.

EVERYDAY GHOSTS

b) Some participants have strong associations with certain names used in this experiment. Perhaps they know someone who shares one of these names. Look over the names in the table provided on a separate sheet and simply circle any names which stood out because of a **STRONG** pre-existing association you had with that name that made it harder or easier to remember the response word and related audio message.

6. Prior to the presentation of the NAMES, you were given a warning in the form of an empty, grey rectangle and asked to use that time to prepare for the upcoming trial. On average, to what extent were you able to prepare yourself to engage with the person you imagined in a neutral or positive way when the grey rectangle appeared?

Never 0 Rarely 1 Sometimes 2 Often 3 Always 4

Please describe exactly what you did to ready yourself for the upcoming trial during the presentation of these warnings:

7. Did the difficulty of engaging with the imagined person in a neutral or positive way change when different NAMES were presented?

Never 0 Rarely 1 Sometimes 2 Often 3 Always 4

Please describe exactly what made certain NAMES/people more difficult to engage with and what techniques you used to help accomplish the task:

8. For any NAME trial, approximately how often did you continue to think about details related to the NAME or that task even after the time was over and new tasks were being presented?

Never 0 Rarely 1 Sometimes 2 Often 3 Always 4

9. How much easier/harder would say it was to successfully complete the NAME task when the NAME had been previously paired with a positive message as opposed to a negative one?

Green was much easier No difference Red was much easier
1 2 3 4 5

12. Last night, how many hours of sleep did you get? (estimate as accurately as possible)

≤2 3 4 5 6 7 8 9 10 ≥11

EVERYDAY GHOSTS

13. Prior to the experiment, to what extent had you been aware of the following experimental paradigms and the related findings? (Please select one option for each of the following):

a. Think/No-Think (TNT) Procedure (e.g., Anderson et al., 2001; 2004)

- | | |
|---|---|
| No awareness | 1 |
| Heard of the name only | 2 |
| Knew the procedure, but not the findings or predictions | 3 |
| Knew the findings & predictions | 4 |
| Have participated or conducted such a study previously | 5 |

b. Thought Suppression/White Bear (e.g., Wegner, 1987)

- | | |
|---|---|
| No awareness | 1 |
| Heard of the name only | 2 |
| Knew the procedure, but not the findings or predictions | 3 |
| Knew the findings & predictions | 4 |
| Have participated or conducted such a study previously | 5 |

c. Retrieval-Induced Forgetting (e.g., Anderson, Bjork & Bjork, 1994)

- | | |
|---|---|
| No awareness | 1 |
| Heard of the name only | 2 |
| Knew the procedure, but not the findings or predictions | 3 |
| Knew the findings & predictions | 4 |
| Have participated or conducted such a study previously | 5 |

14. Regardless of whether you have heard of any of the above-named procedures, have you heard about research on any of the following ideas:

a. Repeatedly pushing an unpleasant/undesirable memory out of mind (i.e., exerting memory control) has the effect of suppressing that memory, making it harder to retrieve at later times, even when one wants to remember it.

- | | |
|---|---|
| No awareness | 1 |
| Heard of the name only | 2 |
| Knew the procedure, but not the findings or predictions | 3 |
| Knew the findings & predictions | 4 |
| Have participated or conducted such a study previously | 5 |

b. Attempting to suppress/not think about certain thoughts paradoxically makes you more likely to think about those things than one would otherwise be liable to do.

- | | |
|---|---|
| No awareness | 1 |
| Heard of the name only | 2 |
| Knew the procedure, but not the findings or predictions | 3 |
| Knew the findings & predictions | 4 |
| Have participated or conducted such a study previously | 5 |

c. The very act of remembering can hurt your ability to retrieve related memories.

- | | |
|------------------------|---|
| No awareness | 1 |
| Heard of the name only | 2 |

EVERYDAY GHOSTS

Knew the procedure, but not the findings or predictions	3
Knew the findings & predictions	4
Have participated or conducted such a study previously	5

15. Before, or at any time during, the experiment did you believe that there would be a final test for response words, with the prediction that WORD responses to NAMEs would be either easier or harder to recall based on the paired message (select one)?

No I definitely didn't suspect a test	1
Might have suspected a test	2
Unsure if I suspected a test	3
Suspected a final test for Responses, but didn't guess the prediction	4
Definitely suspected a final test & guessed the predictions	5

If you suspected that you might be tested on the NAME-WORD pairs later on in the experiment, please indicate, in the space below, anything you did in response to this suspicion:

The following information is being collected for demographic purposes and is not analyzed in relation to the data collected in this experiment.

AGE: _____

GENDER (circle one): Female Male Other

HANDEDNESS (circle one): Left Right Ambidextrous

ARE YOU A NATIVE SPEAKER OF ENGLISH? (circle one): Yes No

ETHNIC CATEGORY (check one of the following):

____ Hispanic or Latino

____ Not Hispanic or Latino

____ Do not wish to report

RACIAL CATEGORIES (check at least one of the following):

____ American Indian or Alaskan Native

____ Asian

____ Native Hawaiian or Other Pacific Islander

____ Black or African American

____ White

____ Do not wish to report

HAVE YOU EVER BEEN DIAGNOSED WITH SOME FORM OF LEARNING DISABILITY, ATTENTION DISORDER, OR NEUROLOGICAL CONDITION (check one, providing a description, if appropriate)?

() Yes, the following:

() No, but I have the following undiagnosed problems that fall into one of these categories:

EVERYDAY GHOSTS

() No

Appendix E (IRB)

a) Debriefing form for the Screening Study (to be displayed as the last screen before the conclusion of the online survey):

DEBRIEFING STATEMENT
BARD COLLEGE

PLEASE KEEP A COPY OF THIS STATEMENT FOR YOUR RECORDS

Study title: Patterns of Reaction: A Survey of Behavior
Principal Investigator: Sean P. Murphy (sm6894@bard.edu)

Thank you for participating in this online survey. This research is designed to explore the basic trends in decision-making and behavior typical of the campus population. By conducting this study, we hope to learn more about how people might handle different scenarios which might introduce different challenges in day-to-day life.

Part of the reason for conducting this study is for the purpose of understanding of individual differences in how they respond to commonly experience obstacles. While different people may react differently when presented with the possibility of an upcoming exam on short notice, we expect there to be reliable patterns of reaction across various scenarios. The results of this survey will help us to gauge the prevailing types of behavior which individuals in the Bard community employ against such challenges as well as gain a better understanding of the student population at Bard who may be interested in and eligible for future research studies.

If you have any questions or concerns, feel free to contact Sean Murphy (by phone at 516-880-4216 or via email at sm6894@bard.edu). You may also contact the faculty advisor for this study, Justin Hulbert (by phone at 845-752-4390 or via email at jhulbert@bard.edu). If you are a student at Bard College and find that any aspect of the experiment caused you distress, you are encouraged to contact the Bard Counseling Center at 845-758-7433 during normal business hours or at 845-758-7777 after hours or on weekends. If you are not a Bard College student but find yourself experiencing significant distress, please contact the National Suicide Prevention Hotline at 1-800-273- 8255.

Again, we thank you for your participation. In the case that you are the winner of the gift card, you will be contacted. If you know of any friends or acquaintances that are eligible to participate in this survey, we kindly request that you not discuss the details with them until after they have had the opportunity to participate. Prior knowledge of questions asked in the survey can invalidate the results. We greatly appreciate your cooperation.

EVERYDAY GHOSTS

b) Debriefing form for the Main Experiment:

DEBRIEFING STATEMENT
BARD COLLEGE

PLEASE KEEP THIS SHEET FOR YOUR RECORDS

Study title: Everyday Ghosts: Examining Memory Modulation in Social Interactions
Principal Investigator: Sean P. Murphy (sm6894@bard.edu)

Thank you for participating in this experiment. This research is designed to explore the basic mechanisms underlying attentional control and memory in contexts of positive and negative social interaction. By conducting this study, we hope to learn more about how people might learn to better focus their attention in a way that allows them to remember what/when they want to remember and forget what/when they want to forget and how our day to day interactions may present obstacles to memory processes.

Before this experiment you participated in a survey investigating coping tendencies and reaction styles. To prevent the results of these studies from being biased, it was necessary to leave the immediate purpose of the survey unstated, as well as the relation between the survey directly with this main experiment.

In the first part of today's experiment, we asked you to focus your attention on one or more primary tasks (e.g., remembering certain practiced memory associations or attending to a target image/sound) without getting distracted by other thoughts, materials, or secondary tasks. Although we were interested in how well you performed on the primary task(s) by controlling your attention, we were also interested in the side effects this type of attentional control has on your ability to learn new, unrelated information. To examine these side effects, we introduced new "distractor" materials between the main task events and later surprised you with a memory test for these distractors.

Even though you weren't asked to remember anything in particular about these distractors when they first appeared, research suggests that the types of tasks people perform before and after encountering new information affects how likely individuals are to unintentionally (or "incidentally") remember that information. Shifting one's attention in the primary task can have the effect of temporarily increasing or decreasing activity in the hippocampal region of the brain—a region known to be important for retrieving old event memories and forming new ones. When brain activity is reduced in this region, it seems that people are less likely to learn the new information. When hippocampal activity is increased, however, people appear more likely to learn that new information.

By researching the nature of this side effect through participants' responses and associated behavioral activity, we hope to identify strategies that would allow people to more effectively control and use it to their advantage in everyday life. For example, in learning the types of social scenarios which affect memory, we can better prevent certain memories from being dampened. Looking to individuals who react differently to challenges (for example, by favoring a tendency to push the situations out of mind) we can conduct a far more comprehensive assessment of how memory is affected by different scenarios that may challenge in day-to-day life.

EVERYDAY GHOSTS

This experiment required us to withhold information from you in order to avoid contaminating the results. In particular, we did not tell you in advance about the surprise memory test at the end of the study. Intentionally trying to learn is a very different process than the learning that incidentally occurs when you perform a task. In fact, past research has shown that trying to learn can interfere with more incidental forms of learning. Therefore, telling you up-front that you would be tested on these materials could invalidate the hypotheses being investigated. We apologize for withholding this information about the experiment before you participated. In addition to this deception you were asked to listen to narratives that were designed to make the certain memory associations negative in nature, a task which may have caused you undue stress that you did not anticipate. *Please let your researcher know if we may still use your data in our study.*

Regardless, if you have any questions or concerns, you may ask your experimenter or feel free to contact Sean Murphy (by phone at 516-880-4216 or via email at sm6894@bard.edu). You may also contact the faculty advisor for this study, Justin Hulbert (by phone at 845-752-4390 or via email at jhulbert@bard.edu). If you are a student at Bard College and find that any aspect of the experiment caused you distress, you are encouraged to contact the Bard Counseling Center at 845-758-7433 during normal business hours or at 845-758-7777 after hours or on weekends. If you are not a Bard College student but find yourself experiencing significant distress, please contact the National Suicide Prevention Hotline at 1-800-273- 8255.

Again, we thank you for your participation. If you know of any friends or acquaintances that are eligible to participate in this study, we kindly request that you not discuss it with them until after they have had the opportunity to participate. Prior knowledge of questions asked during the study can invalidate the results. We greatly appreciate your cooperation.

Appendix F (IRB)

- ¹ Kensinger, E. A., Schacter, D. I. (2008). *Memory and Emotion*. The Handbook of Emotions, Chapter 37, pp. 601-617
- ² Hulbert, J.C., Hirschstein, Z., Brontë, C. A. L., & Broughton, E. (2017). Unintended Side Effects of a Spotless Mind: Theory and Practice. *Memory*.
- ³ Moos, R. H. (1993). *Coping responses inventory: Adult form: Professional manual*. Psychological Assessment Resources, Incorporated.
- ⁴ J. Erskine, L. Kvavilashvili, L. Myers, S. Leggett, S. Davies, S. Hiskey, J. Hogg, S. Yeo, G. Georgiou. (2014) A longitudinal investigation of avoidant coping and ageing. *Journal of Aging & Mental Health, Vol. 20, No. 10, 2016, pp. 1010-1020*
- ⁵ Bradley, M. M., Lang, P. J. (1999) *Affective norms for English words (ANEW): Instruction manual and effective ratings*. Technical Report C-1, The Center for Research in Psychophysiology, University of Florida.
- ⁶ Moos, R. H. (2004). *Coping Responses Inventory: An update on research applications and validity*. Odessa, FL: *Psychological Assessment Resources*.
- ⁷ Schwarzer, R., Schwarzer, C. (1996). A Critical Survey of Coping Instruments. Chapter prepared for: Handbook of Coping.

Appendix G (IRB)



Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that **Sean Murphy** successfully completed the NIH Web-based training course "Protecting Human Research Participants".

Date of completion: 03/04/2016.

Certification Number: 2002437.

EVERYDAY GHOSTS

Appendix G

21 November 2017

Sean Murphy
sm6894@bard.edu

Re: Everyday Ghosts: Examining Memory Modulation in Social Interactions

DECISION: APPROVED

Dear Sean,

The Bard Institutional Review Board reviewed your proposal request (and the minor revisions made in response to the IRB's comments). Your proposal is approved through 21 November 2018. Your case number is **2017NOV21-MUR**. Please notify the IRB if your methodology changes or unexpected events arise.

We wish you success with your research.

Sincerely,

Justin Hulbert
IRB Chair

cc: Deborah Treadway