

2012

# Emotion and Inhibition: Pride Versus Happiness

Emery K. Hilles  
*Scripps College*

---

## Recommended Citation

Hilles, Emery K., "Emotion and Inhibition: Pride Versus Happiness" (2012). *Scripps Senior Theses*. Paper 51.  
[http://scholarship.claremont.edu/scripps\\_theses/51](http://scholarship.claremont.edu/scripps_theses/51)

This Open Access Senior Thesis is brought to you for free and open access by the Scripps Student Scholarship at Scholarship @ Claremont. It has been accepted for inclusion in Scripps Senior Theses by an authorized administrator of Scholarship @ Claremont. For more information, please contact [scholarship@cuc.claremont.edu](mailto:scholarship@cuc.claremont.edu).

Emotion and Inhibition: Pride Versus Happiness

Friday, April 20, 2012

Emery Hilles

Scripps College

### Acknowledgments

I would like to thank my advisors and readers, Deborah Burke, Elizabeth Graham, and Stacey Wood for their encouragement, guidance, and support in the process of developing and writing this thesis and the role they each played in fostering my belief that brains are awesome. Next, I would like to thank my friends and family for being all ears when I get lost in telling them why brains are awesome. Finally, I would like to extend special thanks to my mother, Diza Hilles, for her keen editorial eye and love.

### Abstract

The central question of my thesis is how different positive emotions affect inhibition. Katzir, Eyal, Meiran, and Kessler (2010) addressed this question using an antisaccade task and found that happiness decreased inhibition compared to pride, which they attribute to the links between pride and long-term goals and happiness and short-term goals. I attempted to generalize their results to a color-naming Stroop task and predicted that their results would not generalize because their study had little supporting research and their method had several limitations. I tested 45 students of the Claremont Colleges and found partial support for Katzir et al. Participants in the pride condition showed better inhibitory function than participants in the neutral condition, but I was unable to find differences in inhibitory function between participants in the pride and happiness or happiness and neutral conditions. The results suggest that pride improved inhibitory function compared to neutral emotion, but happiness had no effect. I conclude that further research is needed to confirm the supposed distinction between pride and happiness, the strength of the links between happiness, pride, and different goals, and the motivational role of emotion in inhibition.

### Emotion and Inhibition: Pride Versus Happiness

I am in a piano recital in a darkened auditorium and someone takes a picture. The flash is bright, but I do not look up and I continue to play. I am throwing shot put in a track meet and hear the gun go off for a race. The sound is startling, but I do not turn toward it and I stay focused on my form. In both of these simple situations, I use my executive system, particularly prepotent response inhibition, which is the ability to deliberately suppress dominant, automatic, or prepotent responses (Sun et al., 2009). Inhibition, like most executive functions, is affected by emotion. In a sad mood, it might be difficult for me to focus and successfully avoid looking at the flash of light, hold back the scream, or restrain myself from turning toward the tap on my shoulder. In a happy mood, it might be just as difficult for me to successfully inhibit. There are various theories and predictions as to how emotion affects the success of inhibition, some of which attempt to go beyond the effect of valence to separate the effects of different emotions of the same valence.

Katzir, Eyal, Meiran, and Kessler (2010) examined the effects of the positive emotions of pride and happiness on inhibition. They hypothesized that feelings of pride would increase inhibition compared to feelings of happiness because pride is linked to long-term goals, whereas happiness is linked to short-term goals. Katzir et al. found that imagining a happiness-eliciting event decreased inhibition on an antisaccade task compared to imagining a pride-eliciting event, as measured by the proportion of correct responses on the task. Katzir et al.'s results are used to support a theory by which the effect of emotions on executive processes is due to the motivational role of distinct emotions. Katzir et al.'s findings are interesting because the influence of emotions on executive functions is typically attributed to the neurophysiological consequences of emotion (Ashby, Isen, & Turken, 1999)

or to emotion's consumption of cognitive resources (Oaksford, Morris, Grainger, & Williams, 1996; Phillips, Bull, Adams, & Fraser, 2002). Katzir et al.'s theory differs from these more accepted hypotheses because it attributes the influence of emotions on executive function to their direct effect on motivation. Because Katzir et al. was a relatively recent study, however, there is a dearth of studies that test Katzir et al.'s hypothesis. Furthermore, there are some questionable aspects of Katzir et al.'s procedure. For my thesis, I will determine whether Katzir et al.'s results can be extended to another executive function task that taps inhibition, the Stroop task. Here, I discuss the role of executive functions, specifically inhibition, the ways inhibition is studied, and the effects of emotion on executive functions. I conclude this review of literature with a discussion of Katzir et al. and the study I conducted to determine the generalizability of Katzir et al. and investigate whether the distinct motivational role of different positive emotions modulates their effect on executive function.

### **Executive Functions: Inhibition**

The purpose of executive functions is shifting mental sets, monitoring and updating working memory representations, and inhibition of prepotent responses (Miyake et al., 2000). One functional implication of executive functions is successful self-control or self-regulation (Katzir et al., 2010). Self-control conflicts arise, for example, when a person faces a choice between a long-term goal with large, delayed benefits, and a short-term goal, with smaller, more immediate benefits (Baumeister, Heatherton, & Tice, 1994; Trope & Fishbach, 2000). Executive functions serve adherence to long-term goals by inhibiting prepotent short-term desires (Barkley, 2001), holding a goal and goal-related information in working memory

(Kane et al., 2007), shielding goals from interference, and switching flexibly between goals (Kessler & Meiran, 2008).

Barkley (2001) explored the relationship between the inhibition of short-term desires and long-term goal attainment. Barkley pointed out that long-term goal attainment requires self-regulation in order to resist the more immediate benefits of short-term goals. Response inhibition is a prerequisite to self-regulation. According to Barkley, response inhibition may occur at different stages of emitting a response. First, response inhibition can be applied to the initial prepotent response to an event. Second, it can apply to interruption of an ongoing response that is proving ineffective. Finally, response inhibition can serve to protect the executive responses and the goal-directed behavior they generate from disruption by competing events and responses through control of attention.

Of principle interest here is the relationship between inhibition at the prepotent stage and long-term goal pursuit. Two tasks used to study prepotent response inhibition are the antisaccade task and the Stroop task. A saccade may be an automatic or directed response to a visual stimulus. In antisaccade tasks, a visual onset is presented and the participant is required to make an eye movement away from the onset location to another target. The antisaccade task was developed by Hallet (1978) to examine the mechanisms responsible for generating automatic and goal-directed saccades. Katzir et al. provide one example of how the task has subsequently been adapted to study inhibitory control. They presented a fixation point in the middle of the screen. The visual distractor was then presented to one or the other side of the fixation point, followed by a target stimulus on the other side. Then the distractor disappeared, and a black square masked the target after brief presentation. The target stimulus was an arrow pointing up, down, left, or right. Participants were required to

respond with the direction of the arrow, and in order to do so, needed to inhibit their prepotent response to the distractor. Incorrect responses to the direction of the arrow indicated failure to inhibit the distractor.

Another task used to study prepotent response inhibition is the Stroop task. The Stroop task is named for its inventor, John Ridley Stroop, who was concerned with investigating interference (1935). In the classic Stroop task (Anderson, 2010), the participant is presented with color names displayed in incongruent colors of ink. For example, the participant would see the word “red” in blue ink or the word “green” in red ink. The participant’s task is to name the color of the ink, while ignoring the word. The researcher measures how quickly and accurately the participant is able to name the ink color and interprets a longer delay as an indicator of interference. Stroop found that participants took longer to name the color of the ink when it was incongruent with the word than when the color of the ink was congruent with the word. The Stroop task requires inhibitory control because the participant must inhibit his or her prepotent response to the base word in order to name the ink color.

### **Emotion and Inhibition**

Inhibition is used to regulate emotion, but emotion might regulate inhibition as well. The exact nature of the effect of emotion is debated, however, and there are different hypotheses regarding the effect of happy mood on executive function tests. Ashby et al. (1999) conducted a review of literature and hypothesized that positive emotion improves cognition. By their theory, moderate levels of positive affect improve the executive functions of working memory and cognitive set selection because of the accompanying increase in dopamine release in the anterior cingulate cortex and prefrontal cortex – two brain



structures that are involved in the executive functions. Ashby et al. based their theory on the fact that dopamine controls the flow of information in the frontal lobes and that dopamine disorders in this region cause decline in the executive functions of memory, attention, and problem solving.

One source of data in support of Ashby et al.'s theory comes from patients with Parkinson's disease. When patients with Parkinson's disease are given L-dopa, a precursor to dopamine that increases dopamine levels, their working memory is improved (Lange et al., 1992). By the same token, typical people with Parkinson's disease who have reduced dopamine levels in the prefrontal cortex show memory deficits (Gotham, Brown, & Marsden, 1988). Ashby et al. draw the conclusion that working memory is optimized at some intermediate dopamine level, but is compromised at low dopamine levels.

Alternatively, it has been argued that positive emotion impairs performance on executive function tasks. Oaksford et al. (1996) used the Tower of London task to test performance in a positive mood state. The Tower of London is a classic executive function task that taps a wide range of executive functions, including planning, working memory, attention, problem solving, inhibition, mental flexibility, initiation, and monitoring of actions. Oaksford et al. found that induced positive mood impaired performance on the Tower of London task compared to neutral mood. Oaksford et al. concluded that positive emotion suppresses executive function task performance by reducing the cognitive resources available for the task. Oaksford et al. predicted that negative emotion would have similar effects, but were unable to achieve significant results for negative emotion. Oaksford et al.'s conclusion regarding positive emotions is largely based on the resource allocation theory of emotion, which holds that emotion leads to spontaneous retrieval of emotional material and this

spontaneous retrieval may lead to task-irrelevant processing and subsequent depletion of executive resources (Ellis & Ashbrook, 1987).

Like Oaksford et al., Phillips et al. (2002) found that positive mood impaired executive task performance. Phillips et al. used the Stroop task as their test of inhibition and compared four naming conditions: control, naming the color of ink in which words are printed; color word reading, reading aloud color words printed in different color inks; the classic Stroop condition, naming the color of ink in which incompatible color words are printed; and switching between naming color of ink and reading color words. Participants were either in a neutral mood or induced into a positive mood using the mood-memory technique, in which they were asked to identify an occasion on which they experienced a high level of happiness, to think about that event, describe it to the experimenter, and to answer further questions about the event. For the neutral mood condition, participants engaged in the same induction activities, but for a neutral event. Participants then completed the Stroop task for all four naming conditions. Phillips et al. found that being in a happy mood resulted in significantly slower performance on the alternating condition of the Stroop task and Stroop cost that approached significance in each of the other conditions. They found that either positive mood impairs performance compared to neutral mood on tasks that require a higher executive load or that positive mood causes particular impairment on attentional switching because attention is more likely to be distracted by thoughts that maintain a positive mood.

### **Emotion and Motivation**

Katzir et al. were interested in the influence of different positive emotions on inhibition. They proposed a theory by which associations between distinct positive emotions

and goals modulate the influence of emotional events on the executive system. Specifically, they believed that happiness, because it is linked to short-term goals, decreases inhibition compared to pride, because it is linked to long-term goals. Katzir et al.'s theory was based on evidence that imagined pride and imagined happiness influence the executive function of inhibition differently. Eyal and Fishbach in an unpublished paper (2010; as cited by Katzir et al.) found that the emotions of pride and self-worth are implicitly associated with long-term goals. In their experiment, Eyal and Fishbach compared the performance of participants exposed to words related to happiness or asked to write about a future event likely to evoke happiness and participants exposed to words related to pride or asked to write about a future event likely to evoke pride. Eyal and Fishbach compared happiness and pride participants in their subsequent persistence on a "difficult task" (the details of which are not available) or their resistance to consumption of chocolate. Eyal and Fishbach found that participants exposed to words related to happiness or asked to write about a future event likely to evoke happiness, exercised less self-control in the difficult task or chocolate consumption task than participants exposed to words related to pride or asked to write about a future event likely to evoke pride. Eyal and Fishbach concluded that happiness is implicitly related to short-term goals (i.e. escaping a difficult task, giving in to the allure of chocolate), whereas pride is implicitly related to long-term goals (i.e. persisting on a difficult task, resisting the temptation of chocolate). While Eyal and Fishbach's results are intriguing, their study is difficult to evaluate because it is unpublished and Katzir et al. did not provide adequate details regarding the emotional manipulations and task requirements.

Williams and DeSteno (2008) found a similar link between pride and long-term goals. They found that that the emotion of pride mediates perseverance toward long-term goals

despite initial short-term costs. In their study, Williams and DeSteno told participants they were conducting in an experiment on individual differences in cognitive abilities involving visual perception and mental rotation. Participants were also told that their performance on the first task would be predictive of their performance on the second task. In the first task, participants estimated the number of dots on a PC screen, but the task was designed so that participants would not be able to confidently evaluate whether their estimate was correct. After the task, the experimenter either gave participants acclaim or a high score in order to manipulate participants' sense of pride. It was hypothesized that participants given acclaim would feel greater pride compared to participants given a high score.

Participants in the Williams and DeSteno study then moved on to a tedious mental rotation task and were instructed to complete as many exercises as they wanted, to stop any time, and to consider that there were too many exercises to be completed in the time available. Following this task, participants completed a manipulation check that confirmed that participants given acclaim felt more pride compared to participants given score information. Williams and DeSteno found that participants who had been given pride-inducing acclaim persisted longer in the mental rotation task than participants who had been given performance information. In a second experiment, Williams and DeSteno compared the mental rotation task performance of participants who received acclaim with participants who were induced into a positive mood and found that, again, participants who received acclaim and subsequently felt pride persisted longer in the task. Williams and DeSteno interpreted their findings to show that the emotion of pride is motivational and serves as an incentive to persevere in a task (i.e. a long-term goal) despite short-term costs; in this case,

the cost was continuing the difficult task and not enjoying the relaxation benefit of ceasing the task.

One important aspect of Williams and DeSteno is unclear. It is doubtful that persisting in a difficult task is actually a long-term goal. Working on a difficult task clearly takes longer and requires more effort than ceasing a difficult task, but persisting on a task for several minutes does not fit our usual conception of long-term goals.

### **Katzir et al. on Emotion and Inhibition**

Katzir et al. predicted that pride and happiness would influence executive functions based on the hypothesized links between pride and long-term goals and between happiness and short-term goals. They predicted that imagining a future event of happiness would decrease inhibitory control compared to imagining a future event of pride because imagined happiness would prime short-term goals and imagined pride would prime long-term goals. These predictions hinge on two hypotheses: first, on the hypothesis that pride and long-term goals are implicitly linked and that happiness and short-term goals are implicitly linked (Eyal & Fishbach, 2010; as cited by Katzir et al.); and second, on the hypothesis that executive functions serve adherence to long-term goals by inhibiting prepotent short-term desires (Barkley, 2001). If long-term goals are primed, inhibitory mechanisms are presumably activated. If long-term goals are not primed, or if short-term goals are primed, then inhibitory mechanisms will not be activated and inhibitory control will suffer.

Two potentially problematic issues are not clearly addressed by Katzir et al. First, they did not explicitly define long- and short-term goals. Based on their experimental design explained below, they implicitly define short-term goals as those that offer immediate gratification and long-term goals as those that offer delayed gratification. The definition of

long- and short-term goals cannot be taken for granted because in different contexts, these terms can carry different meanings. For example, in our commonplace conception of goals, long-term goals refer to what may be attained in the distant future, whereas short-term goals refer to what may be attained in the near future. Katzir et al., however, seem to be using a definition of long- and short-term goals based on the proximity of gratification to the action taken.

Second, Katzir et al. did not acknowledge that both long-term *and* short-term goals are vulnerable to interference and may require inhibition. If you are playing in a piano recital, for example, and your short-term goal is to finish your piece correctly, then you must inhibit a respond to someone taking a picture with flash in order to achieve your goal. This is problematic for Katzir et al. because it seems to narrow their definition of short-term goals to what may be attained in the near future without inhibition. This definition excludes willful actions toward short-term goals, which is not the definition I believe Katzir et al. intended. It is perhaps more accurate to characterize their conception of short-term goals as what may be attained in the near future with less inhibition over time than long-term goals.

In order to test their prediction that happiness would decrease inhibition compared to pride, Katzir et al. used an antisaccade task as a measure of inhibition. In Experiment 1, there were three participant conditions. In the first condition, participants were asked to write about a future experience they expected to evoke feelings of happiness and fun. In the second condition, they were asked to write about a future experience they expected to evoke feelings of pride and self-worth. In the third condition, participants were asked to imagine an emotionally neutral event. In order to strengthen the imagined emotion, participants were exposed to pictures of individuals expressing the corresponding emotions. All participants

then completed the antisaccade task. In order “to increase [the] inhibitory challenge” (p. 1315), Katzir et al. used all male participants and used pictures of female models in bathing suits as the distractor that participants needed to make a saccade away from. Katzir et al. predicted that participants who imagined a happiness-eliciting event would perform less well on the antisaccade task compared to participants who imagined a pride-eliciting event because imagining happiness primes short-term goals, whereas pride primes long-term goals. The dependent measure was the proportion of correct responses (correct identification of the direction of the target arrow) on the antisaccade task.

Consistent with their hypothesis, Katzir et al. found a smaller proportion of correct responses in the imagined-happiness condition than in both the imagined-pride condition and the neutral condition. Katzir et al. also found, however, that there was no difference in the proportion of correct responses in the imagined-pride and control conditions, which was contrary to their hypothesis that the consideration of pride-eliciting events would increase inhibition compared to the neutral condition. Katzir et al. realized a limitation: the use of models in bathing suits as a distractor might have led participants in the imagined-happiness condition to gaze longer at those happiness-eliciting pictures, resulting in poorer performance.

In order to rule out the possibility that imagined happiness increased the tendency to gaze longer at pictures related to happiness rather than decreasing the inhibition of any distractors, Katzir et al. conducted Experiment 2 in which they used distractor pictures related to happiness as well as related to pride. In this study, half of the participants were in the happy mood condition and performed the antisaccade task with happiness pictures – the models in bathing suits – while the other half performed were in the pride mood condition

and performed the task with pride pictures – images of national pride and achievement symbols such as images of the Israeli flag, medals, and graduation symbols. If the participants in the imagined-happiness condition were gazing at happiness pictures longer because of their relationship to the imagined emotion, then pride participants would gaze at pride pictures longer and the effect observed in Experiment 1 would disappear. Katzir et al. predicted, however, that imagining happiness would decrease inhibition regardless of distractor content. In other words, they did not expect the effect reported in Experiment 1 to interact with the distractor condition. Experiment 2 was identical to Experiment 1, except that there was no neutral control condition in Experiment 2.

Katzir et al. replicated the results of Experiment 1 with the proportion of correct responses smaller in the imagined-happiness condition than in the imagined-pride condition. They found that the effect of imagined emotion on inhibition was independent of distractor content, ruling out the explanation that imagined happiness increased tendency to gaze at "pleasurable" pictures rather than impairing inhibition (p.1318).

Katzir et al. attributed their results to the possibility that some imagined emotions influence inhibition while others do not. They also propose the possibility that in the academic setting in which the study was conducted, pride and long-term goals are continuously activated, making the neutral condition in fact more similar to the imagined-pride condition. Katzir et al. ultimately concluded that imagining events that elicit positive emotions differentially affect inhibition, a mechanism enabling self-regulation. They believed that because pride is linked to long-term goals and happiness is linked to short-term goals, imagining future events likely to elicit those emotions either increases or decreases inhibition respectively.



Katzir et al.'s theory that distinct emotions affect executive function differently due to their motivational role requires more supporting evidence. Besides limited supporting research, Katzir et al. had several limitations in their study. First, they used all male participants and images of female models as their distractors in order to increase the inhibitory challenge. Images of female models may be distracting to males in particular because they are sexually arousing, not simply because they are related to happiness. This would be problematic because participants in Experiment 2 were divided such that the participants in the happiness condition saw only images of female models in bathing suits and people in the pride condition saw only symbols of pride, so it is possible that participants in the happiness condition did not perform as well because the stimuli was sexually arousing. Second, Katzir et al. had a neutral emotion condition, but did not have a condition with neutral distractor content. Without a neutral distractor condition, it is be impossible to measure a baseline level of inhibition. A baseline is important because it would show how distracting images are in general for people in different emotional conditions. Finally, Katzir et al. only used one type of inhibition task. To ensure the validity of their results, it is important for their findings to generalize to another task.

For my thesis, I tested whether Katzir et al.'s findings generalized to the Stroop task, another executive function task that taps prepotent response inhibition. I used the classic color-naming Stroop task. Before participants completed the Stroop task, I induced them into imagined-happiness, imagined-pride, or neutral emotion conditions using the same method as Katzir et al. This method consisted of instructing participants to imagine a happiness-eliciting, pride-eliciting, or neutral event and exposing participants to images of people displaying the corresponding emotions. The dependent measure was reaction time to

indicate the color of the words. Longer reaction time presumably indicated that participants had difficulty inhibiting the base word to indicate its color.

If Katzir et al.'s theory was correct, I expected to see longer reaction times for participants in the imagined-happiness condition. Because Katzir et al. has limited support and several limitations that might have exaggerated their results, I predicted that their findings would not generalize to another task. I believed that I would find the general effect that positive mood impairs inhibition, resulting in longer reaction times for both imagined-happiness and imagined-pride compared to controls, but without significant difference between reaction times for imagined-happiness and imagined-pride. I based this prediction on Phillips et al.'s finding that positive mood impaired inhibition on various Stroop task conditions and their suggestion that positive mood interferes with attention.

## **Method**

### **Participants**

Participants were a convenience sample of 45 students of the Claremont Colleges (24 women, 21 men) who volunteered to take part in a study about emotion and inhibition. The participants were randomly assigned to happiness, pride, or neutral emotion conditions. Each emotion condition was comprised of 15 participants.

### **Materials**

The images used in the emotional manipulation were of men and women who appeared happy, proud, and neutral taken from Tracy, Robins, & Schriber (2009) and were the same images used in Katzir et al. The Stroop task was adapted from Stroop (1935) and programmed using SuperLab. The base-words were "red," "blue," "green," and "yellow" and were presented in red, blue, green, or yellow font. A congruent trial consisted of a base-word

presented in a font color that matched the word. For example, the word “red” presented in red font. An incongruent trial consisted of a base-word presented in a font color that did not match the word. For example, “red” presented in blue font. There were 96 trials: 4 presentations of 12 types of incongruent trials and 12 presentations of 4 types of congruent trials. Words were programmed in 48-point font and each word was followed by a 500 millisecond inter-stimulus interval (ISI). Participants indicated the color of the font using a keyboard.

### **Procedure**

The procedure was adapted from Katzir et al. and the independent variable was emotional condition. Participants were randomly assigned to one of three conditions: pride, happiness, or neutral. The first part of the experiment was an emotional manipulation. Participants were instructed to describe an event that would make them feel pride and self-worth (pride condition) or happiness and joy if it happened in the near future (happiness condition), or how their room would look in the near future (control condition). Participants were then exposed to four pictures of individuals (two male and two female) with proud, happy, or neutral expressions corresponding to the participant’s emotion condition, presented from the waist up (Tracy, Robins, & Schriber, 2009). In order to mask the intent of the image presentation, participants were asked to rate each picture on brightness and sharpness (7-point scale: -3 = *not sharp/not bright*, 3 = *sharp/bright*).

After the emotion induction, participants completed the Stroop task to measure inhibition success. Participants in all conditions were instructed to press a specific keyboard key, as quickly as possible, corresponding to the ink color of the presented base-word and response time (RT) was recorded. Upon completion of the task, participants were debriefed

as to the purpose of the experiment. RTs below 200 milliseconds and above 2000 milliseconds as well as erroneous responses were excluded from data analysis. The dependent measure was percent increase in RT between the congruent and incongruent trials which I represented as the Stroop interference score for each participant; Stroop interference =  $(\text{mean RT incongruent} - \text{mean RT congruent}) / \text{mean RT congruent}$  in percent.

### Results

A one-way ANOVA was conducted to compare the effect of emotional condition on Stroop interference after pride, happiness, or neutral emotion manipulations. There was a marginally significant effect of emotional condition on Stroop interference for the three conditions [ $F(2, 42) = 2.98, p = 0.06$ ]. Post hoc LSD comparisons indicated a significant difference between the pride condition ( $M = 6.58\%, SD = 6.50\%$ ) and the neutral condition ( $M = 13.17\%, SD = 9.09\%$ ). There was no significant difference between the pride condition and the happiness condition ( $M = 9.76\%, SD = 6.29\%$ ). Neither was there a significant difference between the happiness and neutral conditions.

### Discussion

This experiment was designed to determine whether Katzir et al.'s finding that happiness decreased inhibition compared to pride or neutral emotion could be replicated in another prepotent response inhibition task, the Stroop task. My first prediction was that Katzir et al.'s findings would not generalize to another task because Katzir et al. had several limitations and potentially exaggerated results. My second prediction was that I would find a general effect that positive mood impairs inhibition compared to neutral mood based on evidence that positive mood interferes with attention (Phillips et al., 2002). Contrary to my predictions, I found that participants in the pride condition had a significantly smaller

average Stroop interference scores compared to participants in the neutral condition. I interpret this difference to indicate increased inhibitory function for people experiencing pride. I did not find significant differences in Stroop interference between the pride and happiness conditions or happiness and neutral conditions. I interpret this result to show that people experiencing happiness or neutral emotion had comparable levels of inhibitory function. Both the significant and insignificant results failed to support my hypotheses that Katzir et al.'s results would not generalize and that positive mood would impair inhibition compared to neutral mood.

Although my prediction that Katzir et al.'s findings would fail to generalize was incorrect, my results only partially support Katzir et al.'s theory. Katzir et al.'s primary significant result was that participants in the happiness condition showed decreased inhibitory functioning compared to participants in both the pride and neutral conditions as measured by proportion of correct responses on an antisaccade task. My results, on the other hand, showed that participants in the pride condition had increased inhibitory function compared to the neutral condition, but not compared to the happiness condition. While my results do not match the pattern of Katzir et al.'s results, they do support the aspect of Katzir et al.'s theory that holds that pride increases inhibitory function. My results, however, do not support the aspect of Katzir et al.'s theory that holds that happiness decreases inhibition compared to pride.

The first possible explanation for my mixed results is that the emotional manipulation for pride may have been stronger than the emotional manipulation for happiness. During the emotional manipulation, participants in the pride condition were asked to describe an event that would make them feel pride and self-worth if it happened in the near future. Many

participants wrote about graduation or securing jobs and internships. Participants in the happiness condition were asked to describe an event that would make them feel happiness and joy if it happened in the near future. Many participants in this condition wrote about seeing pets or visiting family. It is possible that the events described in the pride condition evoke a stronger emotion than the events described in the happiness condition because they are more consequential and affect the rest of a person's life. Interestingly, participants in both the pride and happiness conditions wrote about receiving good grades. This crossover points to the possibility that the emotions felt in the pride and happiness conditions are related. If participants in the happiness condition felt an emotion that is closer to pride than to happiness, then there would likely be no significant difference in participants' inhibitory functioning between pride and happiness, as the results indicated.

Happiness and pride are two positive emotions that are difficult to tease apart. One way of drawing a more distinct line between the two would be to prompt participants with the sort of events the experimenter considers "happy" and events the experimenter considers "proud." For example, the prompt for happiness might suggest events such as having a piece of candy or watching a favorite television show, while the prompt for pride might suggest events such as graduation or earning a good grade. This strategy seems likely to elicit more distinct responses for happiness and pride, but another possibility is that my results show that the natural distinction between happiness and pride is too blurred for people to be able to consider the emotions independently. If this is the case, then the emotions of happiness and pride do not constitute truly independent variables and the entire premise of Katzir et al.'s theory – the distinction between happiness and pride – is challenged.

The second possible explanation for my results and inability to fully confirm or contradict Katzir et al.'s theory is that the methodological differences between my experiment and Katzir et al.'s experiment may have been too great. Katzir et al. used an antisaccade task, but I used a Stroop task with the goal of determining whether their results would generalize to a different inhibition task. Both the antisaccade task and the Stroop task test prepotent response inhibition, but prepotent response inhibition may be multifaceted. It is possible that the antisaccade task taps a different aspect of inhibition than the Stroop task in which case, results from the antisaccade task would not be expected to generalize to the Stroop task at all.

A more likely methodological explanation for the differences in my and Katzir et al.'s results is that Katzir et al.'s limitations created the circumstances necessary to see their results. One of Katzir et al.'s limitations included the confounding of sexual arousal and happiness by the use of female models in bathing suits as distractors for participants who were all male. The sexual component of Katzir et al.'s study may have created a type of distraction much different than the type of distraction created by an incongruent color/word stimulus in the Stroop task. In Katzir et al.'s first experiment, they only used pictures of female models in bathing suits for their distractor images and in their second experiment they used these "happy" images for participants in the happiness condition and used proud images, such as national and graduation symbols for participants in the pride condition and found no difference related to the content of the distractor images. The sexual nature of the distractors for the happiness condition might have been necessary to achieve their results. A second limitation of Katzir et al. is that they did not use any neutral distractor content to find a baseline level of distraction in their task. Because Katzir et al. did not find differences due

to distractor content, I supposed that distractor content should be irrelevant and used only neutral stimuli in my experiment. It is possible that inhibition of emotionally salient material is different than inhibition of neutral material. Emotional stimuli capture more attention than neutral stimuli, so it is possible that if I had used words related to pride and happiness rather than neutral words, I might have achieved more dramatic results or results more similar to Katzir et al.

Emotional distractor stimuli might have been just the right choice in Katzir et al. because long-term and short-term goals have an emotional component and in pursuit of these goals, emotional distractors would be the most relevant and salient. For example, the goal might be graduating or the goal might be having a piece of cake. Both goals are emotional in their own ways and would require the pursuer to inhibit appealing distractions with emotional implications, such as hanging out with friends or stopping to stare at a bikini-clad girl on the lawn. In pursuit of the original goals, neutral distractors would likely be less salient and easier to inhibit. For Katzir et al., this would mean that participants primed for short-term or long-term goals with happy or proud implications would be more distracted by interesting, competing emotional stimuli than by neutral, basically irrelevant stimuli.

In future research, I would use the same method, but I would use happiness, pride, and neutral words in case the use of emotional stimuli accounts for the differences between my results and Katzir et al.'s results. Another possibility would be to use the same antisaccade task as Katzir et al., but use neutral stimuli. This method would eliminate the possible confounding of sexual arousal and happiness found in Katzir et al. and would be sure to tap the same inhibitory mechanism as Katzir et al. if it is the case that antisaccade tasks require a different inhibitory mechanism than Stroop tasks. Future research on positive



emotion and inhibition should seek to determine whether Katzir et al. are working with a significant distinction between happiness and pride, whether there are reliable connections between happiness and short-term goals and pride and long-term goals, and whether the effect of different positive emotions may be generalized. Further evidence is needed in support of the motivational power of positive emotion and its effect on inhibition.

## References

- Anderson, J. R. (2010). *Cognitive Psychology and Its Implications*. New York: Worth Publishers.
- Ashby, F. G., Isen, A. M., & Turken, A. U. (1999). A neuropsychological theory of positive affect and its influence on cognition. *Psychological Review*, *106*(3), 529-550.
- Barkley, R. A. (2001). The executive functions and self-regulation: An evolutionary neuropsychological perspective. *Neuropsychology Review*, *11*(1), 1-29.
- Baumeister, R. F., Heatherton, T. F., & Tice, D. M. (1994). *Losing control: How and why people fail at self-regulation*. San Diego, CA: Academic Press.
- Ellis, H. C., & Ashbrook, P. W. (1987). Resource allocation model of the effects of depressed mood states. In K. Fiedler & J. Forgas (Eds.), *Affect, cognition and social behaviour*. Toronto, Ontario, Canada: Hogrefe.
- Eyal, T., & Fishbach, A. (2010). *The motivation-emotion matching hypothesis* Unpublished manuscript, Ben-Gurion University of the Negev.
- Gotham, A. M., Brown, R. G., & Marsden, C. P. (1988). "Frontal" cognitive function in patients with Parkinson's disease "on" and "off" levodopa. *Brain*, *111*, 299-321.
- Hallet, P. E. (1978). Primary and secondary saccades to goals defined by instructions. *Vision Research*, *18*, 1279-1296.
- Kane, M. J., Brown, L. H., McVay, J. C., Silvia, P. J., Myin-Germeys, I., & Kwapil, T. R.

- (2007). For whom the mind wanders and when. *Psychological Science*, 18(7), 614-621.
- Katzir, M., Eyal, T., Meiran, N., & Kessler, Y. (2010). Imagined positive emotions and inhibitory control: The differentiated effect of pride versus happiness. *Journal of Experimental Psychology*, 36(5), 1314-1320.
- Kessler, Y., & Meiran, N. (2008). Two dissociable updating processes in working memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 34(6), 1339-1348.
- Lange, K. W., Robbins, T. W., Marsden, C. D., James, M., Owen, A. M., & Paul, G. M. (1992).  
*L-DOPA withdrawal in Parkinson's disease selectively impairs cognitive performance. Psychopharmacology*, 107, 394-404.
- Miyake, A., Friedman, N. P., Emerson, M. J., Witzki, A. H., Howerter, A., & Wager, T. D. (2000). The unity and diversity of executive functions and their contributions to complex "frontal lobe" tasks: A latent variable analysis. *Cognitive Psychology*, 41, 49-100.
- Oaksford, M., Morris, F., Grainger, B., & Williams, J. M. G. (1996). Mood, reasoning, and central executive processes. *Journal of Experimental Psychology*, 22(2), 476-492.
- Phillips, L. H., Bull, R., Adams, E., & Fraser, L. (2002). Positive mood and executive function:  
Evidence from Stroop and fluency tasks. *Emotion*, 2(1), 12-22.
- Stroop, J. R. (1935). Studies of interference in serial verbal reactions. *Journal of Experimental*

*Psychology, 18, 643-662.*

Sun, D., Chen Z., Ma, N., Zhang, X., Fu, X. Zhang, D. (2009). Decision- making and prepotent

response-inhibition functions in excessive internet users, *CNS Spectrums, 14(2), 75-81.*

Trope, Y., & Fishbach, A. (2000). Counteractive self-control in overcoming temptation.

*Journal*

*of Personality and Social Psychology, 79(4), 493-506.*

Williams, L. A., & DeSteno, D. (2008). Pride and perseverance: The motivational role of pride.

*Journal of Personality and Social Psychology, 94(6), 1007-1017.*