Neural Activity Underlying Motor-Action Preparation and Cognitive Narrowing in Approach-

Motivated Goal States

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Abstract

High approach-motivated (pre-goal) positive affect states encourage tenacious goal pursuit and narrow cognitive scope. As such, high approach-motivated states likely enhance neural correlates of motor-action preparation to aid in goal acquisition. These neural correlates may also relate to cognitive narrowing associated with high approach-motivated states. The current study investigated motor-action preparation during pre-goal and post-goal states using an index of beta suppression over the motor cortex. Results revealed that beta suppression was greatest in pre-goal positive states, suggesting that higher levels of motor-action preparation occur during high approach-motivated positive states. Furthermore, beta and alpha suppression in the high approach-motivated positive states predicts greater cognitive narrowing. These results suggest that approach-motivated pre-goal states engage neural substrates of motor-action preparation and cognitive narrowing. Individual differences in motor-action preparation relate to the degree of cognitive narrowing.

Keywords: approach motivation, narrow, motor-action preparation, beta suppression, pre-goal, memory

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When walking by an ice cream shop on a summer day, you might experience a strong

feeling of desire to eat ice cream. Should you eat an ice cream cone, you would feel a different

positive affect such as satisfaction or contentment. Anticipatory, as compared to consumptive,

positive affects demonstrate that positive affects vary in approach motivational intensity (Gable

& Harmon-Jones, 2008a; 2008b; Gable & Poole, 2012; Harmon-Jones, Gable, & Price, 2011;

Harmon-Jones, Harmon-Jones & Price, 2013). Some positive affects are high in approach-

motivational intensity (e.g., desire), but other positive affects are low in approach-motivational

intensity (e.g., satisfaction).

High and low approach-motivated positive affects occur at different stages of goal

pursuit. Positive affects high in approach motivational intensity often occur before reaching a

goal (pre-goal). These positive affects may motivate one to move towards a goal (Knutson,

Westdorp, Kaiser, & Hommer, 2000; Gable & Harmon-Jones, 2010, 2011). In contrast, positive

affects low in approach motivation often occur post-goal, or after the desired object or goal is

obtained.

Consequences of Positive Affects Varying in Emotional Intensity on Memory

Positive states low vs. high in approach motivation have different consequences for the

broadening or narrowing of cognitive scope (Fredrickson, 2001; Isen, 2002; Gable & Harmon-

Jones, 2010). Cognitive scope is similar to the breadth of cognitive expansiveness, and it can

occur at perceptual, attentional, or conceptual levels. Past work has revealed that positive affect

states low in approach motivation broaden attentional scope, but positive affect states high in

approach motivation narrow attentional scope (Fredrickson & Brannigan, 2005; Rowe, Hirsh, &

Anderson, 2007; Gable & Harmon-Jones, 2008b; Harmon-Jones, Gable, & Price, 2013). A

narrowed attentional scope resulting from positive states high in approach motivation may focus

cognitive resources on the goal and assist in ultimately obtaining the goal (Hart & Gable, 2013;

Gable & Harmon-Jones, 2013). In contrast, a broadened attentional scope resulting from positive

states low in approach motivation may expand cognitive breadth after goal accomplishment

when a narrowed cognitive scope is no longer necessary for goal pursuit.

One area of cognitive scope where the influence of goal attainment has been investigated

is with central vs. peripheral memory. Gable and Harmon-Jones (2010) measured cognitive

scope using memory for task-irrelevant neutral words presented in the center vs. periphery of

viewing space. Words were unrelated to the goal in order to assess the automatic influence of

approach motivation on central and peripheral memory in general. We manipulated positive

affect using a monetary incentive delay task (Knutson & Wimmer, 2007), because the monetary

incentive delay task activates low- (post-goal) vs. high-approach-motivated (pre-goal) positive

affect within the same person within the same task. Results of two experiments revealed that

positive pre-goal states facilitated recognition memory for centrally presented words as

compared to neutral states. In contrast, positive post-goal states facilitated recognition memory

for peripherally presented words as compared to neutral states. These experiments reveal that

positive pre-goal states enhance central memory, whereas positive post-goal states enhance

peripheral memory.

Motor Preparation and Beta Activity in the Motor Strip

Pre-goal positive affects and narrowing of cognitive scope are associated with enhanced

approach motivation, presumably because such states facilitate acquisition of desired goals

(Larson & Steuer, 2009; Kaplan, Van Damme, & Levine, 2012). One critical aspect to goal

pursuit is movement planning, or motor-action preparation. It seems likely that motor-action preparation is critical in pre-goal states in order to acquire desired goals.

During movement, preparation for movement, and observation of movement, the motor cortex and pre-motor areas of cortex become more active (Babiloni et al., 2015; Sanes & Donoghue, 1993; Cunnington, Windischberger, Deeke, & Moser, 2002). This activation is related to suppression of beta and alpha wave activity measured by electroencephalography (EEG) over the motor strip (McFarland, Miner, Vaughan, & Wolpaw, 2000; Pfurtscheller, Brunner, Schlögl, & Lopes da Silva, 2006). Beta suppression in particular has been consistently used as an index for motor-action preparation. Increases in beta suppression relate to preparation for movement before a target stimulus (Doyle, Yarrow, & Brown, 2005). McFarland, Miner, Vaughan, and Wolpaw (2000) demonstrated that beta suppression occurred when participants made motor movements, as well as when they thought about making motor movements. Thus, beta suppression occurs during real, as well as *imagined,* movement, implying that beta suppression occurs during the visualization of potential motor action. These results suggest that beta suppression is a neurophysiological measure of motor-action preparation.

Other research suggests that approach motivation may influence beta suppression. Meyniel and Pessiglione (2014) provided monetary incentives to participants for squeezing a hand grip at varying levels of difficulty. As incentive levels increased, beta suppression increased. Presumably, individuals were more motivated to act during trials with higher incentive levels. Beta suppression may represent a psychophysiological correlate of motor-action preparation sensitive to motivation of future rewards. In sum, beta suppression is a neurophysiological index of motor-action preparation.

Current Experiment

Based on past work relating pre-goal positive states and memory for centrally presented stimuli, it is likely that neurophysiological processes associated with pre-goal positive states may relate to better memory for centrally presented stimuli. Pre-goal positive states likely prepare an individual to act. Neurophysiological measures related to action preparation are likely higher in pre-goal positive states than post-goal positive states. Moreover, this preparation for action may relate to cognitive processes such as central memory, because such cognitive consequences may facilitate goal achievement. Specifically, beta suppression in pre-goal positive states should predict better memory for centrally presented stimuli, but not peripherally presented stimuli.

The current study sought to investigate whether pre-goal positive states engage greater motor-action preparation than neutral states or positive post-goal states and whether motor-action preparation relates to cognitive scope. Specifically, we sought to examine two novel questions: First, do positive states differing in approach motivation influence neural correlates of motor-action preparation measured by beta and alpha suppression? Second, do neural correlates of motor-action preparation relate to cognitive narrowing, as measured by recall memory? We hypothesize that beta and alpha wave suppression should be greater for pre-goal reward trials than for pre-goal neutral trials, post-goal reward trials, or post-goal neutral trials. Furthermore, as indices of motor-action preparation, greater beta and alpha wave suppression should relate to greater narrowing of cognitive scope, as assessed by better memory for centrally presented stimuli controlling for peripherally presented stimuli.

Method

Participants

Twenty-eight introductory psychology students participated in exchange for partial course credit. Data collection was set to stop at the end of the semester, provided we had at least 25 participants.

Procedure

Participants were told they would play a reaction time game where they had the opportunity to win a total of $10 through a series of trials. Twelve practice trials were included before beginning the game.

Each trial ($n = 120$; see Figure 1) began with either a white circle or a white square cue. Trials beginning with a circle indicated the chance to win a monetary reward based on trial performance. In contrast, trials beginning with a square indicated no chance to win a monetary reward based on performance. These cues served as expectancy cues (pre-goal cues) because they gave participants the expectancy that they would earn money, or not. Half of the trials were reward trials, and half of the trials were neutral trials. Trials were presented in 10 blocks of 12 trials. Blocks presentation was structured so that each block contained the same number of each trial type and the same trial type was not presented more than 3 times in a row. To reduce EEG artifact, participants were instructed to watch each picture for the entire time it was displayed.

Following the circle or square expectancy cue, participants responded to the direction of a center arrow (left or right) in a flanker task (Eriksen & Eriksen, 1974) using buttons on a response pad. Rewards were ostensibly based on whether the participant beat the average reaction time on this trial.

Next, a feedback cue appeared indicating whether the participant did or did not gain money on the trial. The amount of money won was presented in the feedback shape ($0.15 for successful performance, $0.00 in neutral no-reward trials). To give participants the expectancy

that they could beat the average reaction time and gain money, gain and no-gain feedback frequency were manipulated. Two-thirds ($n = 40$) of the reward trials resulted in gaining money. In contrast, two-thirds ($n = 40$) of the neutral trials resulted in no-gain.[1]

Following the feedback (post-goal) cue, another flanker task was presented. This was done in order to have participants perform the same motor action after receiving feedback as they did after an expectancy cue. Participants had the same motor performance goal (i.e., pressing a button), but would have different levels of approach motivation and, presumably, different levels of beta suppression. Participants were told to respond quickly to all flankers task, regardless of condition.
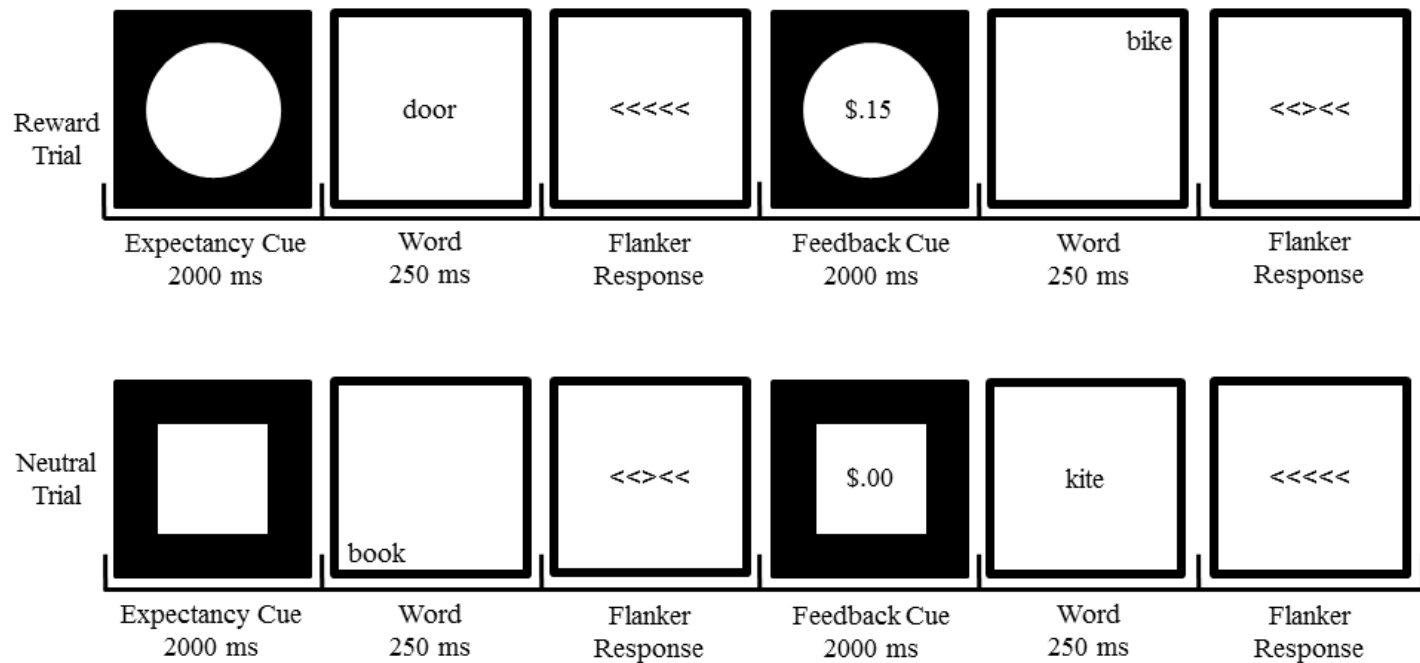
Figure 1. Experiment example trials. Before each flanker task, there was a variable ISI between 500-900 ms. Before each post-goal cue, there was a variable ISI between 300-700 ms. The intertrial interval was 3000-5000 ms.

Immediately following some of the cues (40 expectancy and 40 feedback cues), a word was presented either centrally or peripherally. Centrally presented words were presented directly in the center of the screen. Peripherally presented words were presented in one of the four corners of the screen. Ten centrally and 10 peripherally presented words were displayed for each expectancy/feedback reward/neutral cue condition. Participants were told that the words would appear, but they were unrelated to the game. All words were neutral words matched between conditions for length and frequency from the Affective Norms of English Words (ANEW; Bradley & Lang, 1999).[2] At the end of the game trials, participants completed a surprise recall task. Participants were given two minutes to write down every word they remember being presented throughout the course of the game.

EEG Assessment and Processing

Electroencephalography was recorded from 64 tin electrodes mounted in a stretch lycra Quik-Cap (Electro-Cap, Eaton, OH) and referenced online to the left earlobe. A ground electrode was mounted midway between FPZ and FZ. The electrode cap used was based on the 10-20 system, and a sodium chloride based conductance gel was used to assist in the decrease of impedances. Electrode impedances were kept under 5,000 Ω. Signals were amplified with Neuroscan SynAmps amplifier unit (El Paso, TX), low-pass filtered at 100 Hz, high-pass filtered at 0.05 Hz, notch filtered at 60 Hz, and digitized at 500 Hz. Artifacts (e.g., horizontal eye movement and muscle) were removed by hand. Then, a regression-based eye movement correction was applied (Semlitsch, Anderer, Schuster, & Presslich, 1986), after which the data were visually inspected again to ensure proper correction.

During the expectancy and feedback cues (2000 ms), 1000 ms epochs were extracted using a sinusoidal shaped Hamming window to reduce spectral leakage (50% taper of distal

ends; Davidson, Jackson, & Larson, 2000) and re-referenced to the average of the mastoid

sensors. Consecutive epochs were overlapped by 50% to avoid data loss. Next, power values

corresponding to beta (14-30 Hz) and alpha (8-13 Hz) activity were extracted using a Fast

Fourier Transformation. Data were then averaged across regions of the head at sites

corresponding with the motor cortex (McFarland et al., 2000; Muthukumaraswamy, Johnson &

McNair, 2004; Pfurtscheller, Neuper, Brunner, & da Silva, 2005). Specifically, beta and alpha

suppression was examined at sites C1, C2, C3, C4, C5, C6, CP1, CP2, CP3, CP4, CP5, and CP6.

Differences in maximal suppression of the beta and alpha waves may reflect different

neurological functions (e.g., motor-action preparation vs. simulation) of the beta and alpha waves

(e.g., Jackson, Spinks, Freeman, Wolpert, & Lemon, 2002; Rüther, Brown, & Klepp, 2014). All

data were checked for outliers (greater than 3 standard deviations from the mean). One

participant's memory difference score was removed from analyses.

Results

Beta

A 2 (reward vs. neutral) x 2 (pre-goal vs. post-goal) repeated measures ANOVA revealed

a significant interaction, $F(1, 27) = 4.79$, $p = .037$, $\eta_p^2 = .15$, $\eta^2 = .001$ (see Figure 2a).

Follow up t-tests were conducted using a Bonferroni correction to control for Type-1

error. Ninety-five percent confidence intervals of the effect size are reported in brackets. Results

suggested that beta suppression was greater in the pre-goal reward condition than the pre-goal

neutral condition, $t(27) = 2.75$, $p = .044$, $d = .53$ [0.13, 0.92], and greater in the pre-goal reward

condition than the post-goal reward condition, $t(27) = 3.47$, $p = .008$, $d = .65$ [0.24, 1.06]. Beta

suppression during the pre-goal neutral condition did not differ from beta in the post-goal neutral

condition, $t(27) = 1.33$, $p = .752$. Similarly, beta suppression during the post-goal reward

condition did not differ from beta suppression in the post-goal neutral condition, $t(27) = 0.56$, $p = 1.00$. These results suggest that the pre-goal reward condition had the greatest influence on beta suppression.
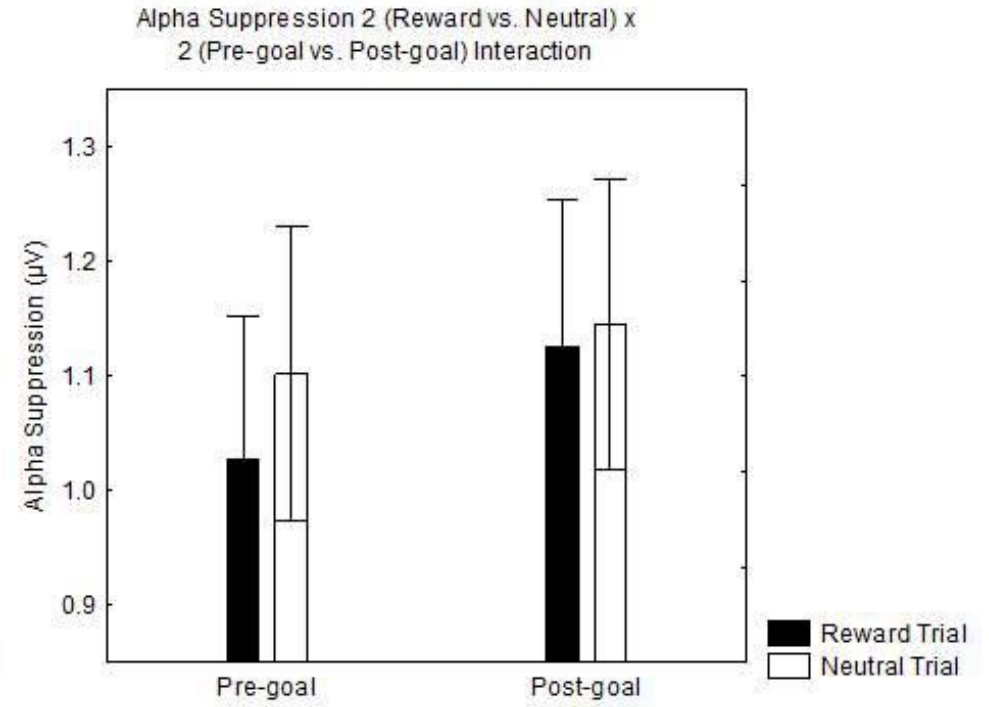
Alpha

A 2 (reward vs. neutral) x 2 (pre-goal vs. post-goal) repeated measures ANOVA examining alpha in each condition revealed a main effect of reward vs. neutral, $F(1, 27) = 5.72$, $p =.024$, $\eta_p^2 = .17$, $\eta^2 = .002$, and a main effect of pre-goal vs. post-goal, $F(1, 27) = 7.77$, $p =.010$, $\eta_p^2 = .22$, $\eta^2 = .003$. However, the interaction was not significant, $F(1, 27) = 2.67$, $p =.114$, $\eta_p^2 = .09$, $\eta^2 < .001$ (See Figure 2b).
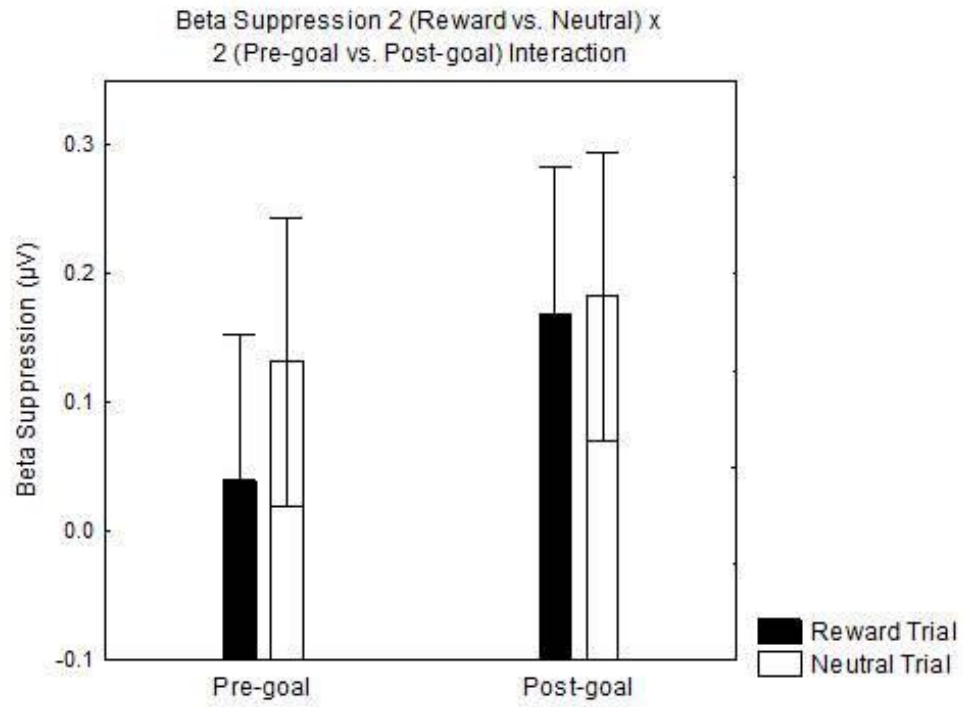
Figures 2A and 2B. (2A) Beta activity and (2B) alpha activity for the 2 (reward vs. neutral) x 2 (pre-goal vs. post-goal) interaction. Less activity indicates greater suppression. Error bars represent standard error of the mean.

Flanker Reaction Times

A 2 (reward vs. neutral) x 2 (pre-goal vs. post-goal) repeated measures ANOVA was performed on the reaction times to the flankers task. Results revealed a significant interaction, $F(1, 25) = 13.09$, $p = .001$, $\eta_p^2 = 0.34$, $\eta^2 = .007$. There was a main effect of pre-goal vs. post-goal, $F(1, 25) = 45.27$, $p < .001$, $\eta_p^2 = 0.64$, $\eta^2 = 0.08$, indicating participants responded faster to the first flankers task (pre-goal) than the second flankers task (post-goal). Also, there was a main effect of reward vs. neutral, $F(1, 25) = 15.17$, $p < .001$, $\eta_p^2 = 0.38$, $\eta^2 = 0.01$, indicating participants responded faster when in a positive state as opposed to a neutral state.

Follow up t-tests were conducted using a Bonferroni correction to control for Type-1 error. Results revealed that reaction times to the flankers task were faster after pre-goal reward cues than after pre-goal neutral cues, $t(25) = 5.13$, $p < .001$, $d = 1.42$, and faster after pre-goal reward cues than after post-goal reward cues, $t(25) = 6.73$, $p < .001$, $d = 1.87$. Reaction times to the flankers task after pre-goal neutral cues were faster than after post-goal neutral cues, $t(25) = 4.89$, $p < .001$, $d = 1.36$. Finally, reaction times after post-goal reward cues did not differ from reaction times after the post-goal neutral cues, $t(25) = 0.60$, $p = 1.00$. These results suggest that participants were motivated by pre-goal and reward trials as compared to post-goal and neutral trials.

Recall Memory

The number of words recalled in each condition were transformed into a percentage of the total words for that condition, then averaged for each condition. A 2 (central vs. peripheral) x 2 (reward vs. neutral) x 2 (pre-goal vs. post-goal) repeated measures ANOVA did not reveal a three-way interaction, $F(1, 26) = 1.68$, $p = .207$, $\eta_p^2 = .06$, $\eta^2 = .002$, between trial type and

memory. There was a main effect of centrally presented vs. peripherally presented words, , $F(1, 27) = 5.76$, $p = .024$, $\eta_p^2 = 0.18$, $\eta^2 = 0.03$. There was also a main effect of reward vs. neutral, $F(1, 27) = 6.66$, $p = .016$, $\eta_p^2 = 0.20$, $\eta^2 = 0.02$. Finally, there was a main effect of pre-goal vs. post-goal, $F(1, 27) = 5.87$, $p = .022$, $\eta_p^2 = 0.18$, $\eta^2 = 0.01$. Means and standard deviations for the percentages, as well as the central minus peripheral difference scores of the raw memory scores, are presented in Table 1.

Table 1

Percentage of recalled central and peripheral words by condition.

	Pre-goal		Post-goal	
	Reward	Neutral	Reward	Neutral
Centrally Presented	5.36 (9.99)	5.00 (8.82)	10.71 (12.15)	2.86 (5.35)
Peripherally Presented	1.07 (3.15)	3.21 (7.23)	5.36 (10.36)	2.86 (6.00)
Cognitive Narrowing	0.30 (0.82)	0.78 (1.55)	0.07 (0.68)	0.00 (0.83)

Note. Standard deviations are in parentheses. Cognitive narrowing was measured by use of a central minus peripheral difference score. Smaller scores indicate greater cognitive narrowing.

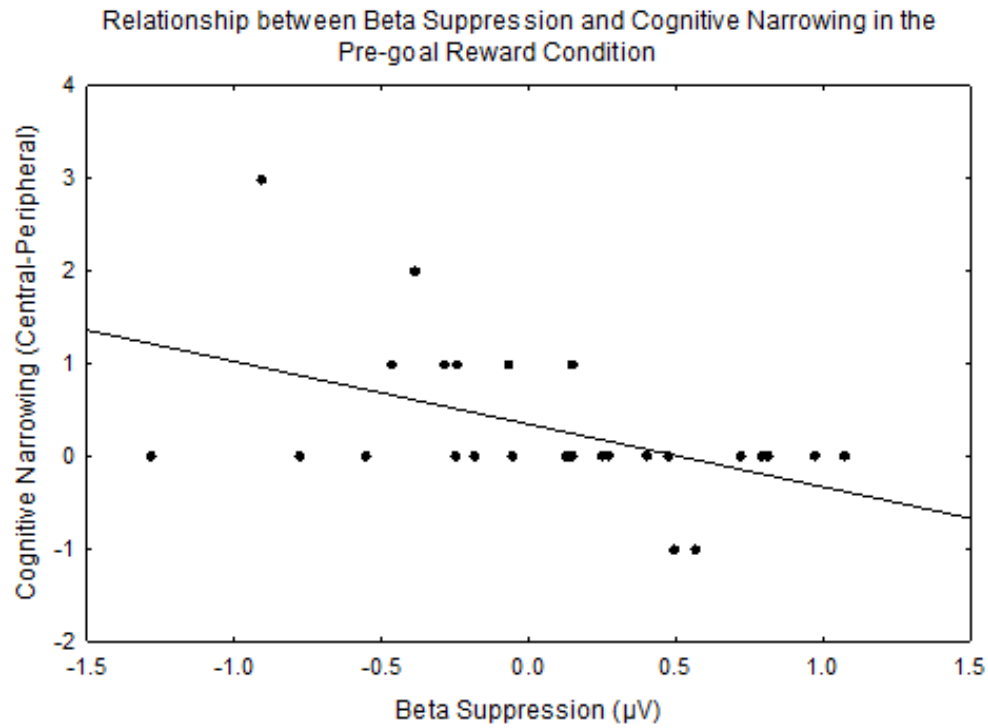**Relationship Between Beta/Alpha Suppression and Cognitive Narrowing**

To control for individual differences in recall memory, a difference score was created for the total number of centrally presented words recalled minus the total number of peripherally presented words recalled in each condition. Higher scores indicate greater levels of cognitive narrowing. Pearson correlations were run in the pre-goal and post-goal conditions between beta and alpha activity and cognitive narrowing for words in that condition. Correlation analyses were Bonferroni-corrected for multiple comparisons.

Results revealed that beta suppression predicted more cognitive narrowing during the pre-goal reward condition, $r(25) = -.48$, $p = .044$ (Figure 3a). These results suggest that greater motor-action preparation during the pre-goal reward condition related to more narrowed cognitive scope. Beta suppression was not correlated with cognitive narrowing after pre-goal neutral cues, $r(25) = -.15$, $p = 1.00$, post-goal reward cues, $r(25) = -.23$, $p = .924$, or post-goal neutral cues, $r(25) = -.32$, $p = .424$.

A Steiger's Z-test was used to determine if the relationship between beta suppression and cognitive narrowing differed between the pre-goal reward and the other conditions. Correlations did not differ between the pre-goal reward condition and post-goal neutral condition ($Z = -0.68$, $p = .497$), post-goal reward condition ($Z = -1.11$, $p = .265$), or pre-goal neutral condition ($Z = -1.37$, $p = .171$). These results suggest that the relationship in the pre-goal reward condition was not different from the other conditions. However, there was only a significant relationship between beta suppression and cognitive narrowing in the pre-goal reward condition.

Alpha suppression marginally predicted more cognitive narrowing during the pre-goal reward condition, $r(25) = -.45$, $p = .080$ (Figure 3b). Alpha suppression was not significantly related to cognitive narrowing after pre-goal neutral cues, $r(25) = -.010$, $p = 1.00$, post-goal reward cues, $r(25) = -.12$, $p = 1.00$, or post-goal neutral cues, $r(25) = -.40$, $p = .148$. A Steiger's Z-test did not reveal differences between the pre-goal reward condition and post-goal neutral condition ($Z = -0.18$, $p = .851$), post-goal reward condition ($Z = -1.44$, $p = .151$), or pre-goal neutral condition ($Z = -1.71$, $p = .087$).

Figure 3: A   B
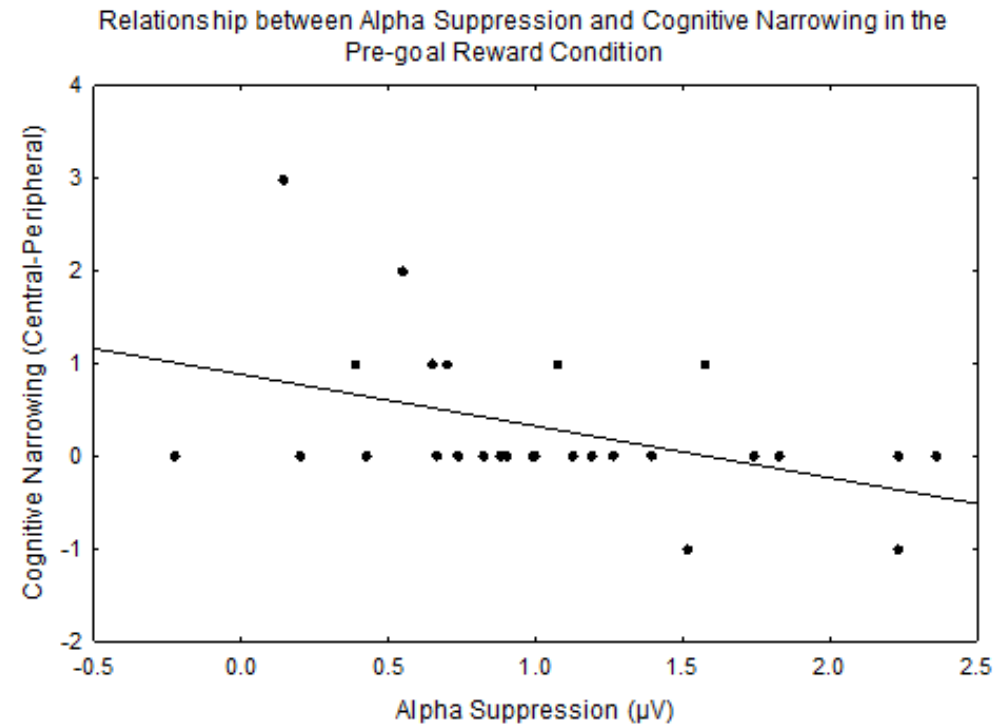
Figures 3A and 3B. Relationship between beta suppression (3A) and alpha suppression (3B) and memory difference scores (central minus

peripheral) in the pre-goal reward condition. Smaller scores indicate greater suppression and greater cognitive narrowing.

Relationship between Beta/Alpha Suppression and Flanker Reaction Times

Beta suppression was not related to flanker reaction times in the pre-goal reward, $r(24) =$ -.39, p = .204, pre-goal neutral, $r(24) = $ -.32, $p = $ .440, post-goal reward, $r(24) = $ -.21, $p = $ 1.00, or post-goal neutral, $r(24) = $ -.10, $p = $ 1.00, conditions. Alpha suppression was not related to flanker reaction times in the pre-goal reward, $r(24) = $ -.22, p = .204, pre-goal neutral, $r(24) = $ -.03, $p = $ .440, post-goal reward, $r(24) = $ -.03, $p = $ 1.00, or post-goal neutral, $r(24) = $ .04, $p = $ 1.00, conditions.

General Discussion

The present experiment revealed that pre-goal positive states enhanced beta suppression as compared to pre-goal neutral or post-goal states. These results suggest that pre-goal positive states activate neural processes associated with motor-action preparation. Additionally, greater motor-action preparation in high approach-motivated positive states predicts cognitive narrowing. Importantly, these results connect neural preparation for motor-action with approach-motivated pre-goal states. Also, individual differences in motor-action preparation relate to a more narrowed cognitive scope in approach-motivated pre-goal states.

In reward-related pre-goal states, approach motivation may be enhancing action preparation to facilitate goal pursuit. High approach-motivated states likely promote motor action preparation because objects of goal pursuit have high reward value (Mirabella, 2014). In addition, focusing cognitive resources on central information may facilitate action towards the anticipated goal. Narrowed cognitive scope may be coupled with individual differences in beta suppression to aid goal-related actions. Likewise, motor preparation may require greater cognitive focus. The relationship between individual differences in cognitive narrowing and motor preparation could be adaptive for goal pursuit.

Analyses of the flanker reaction times revealed that participants were faster to respond in the pre-goal expectancy condition than the other three conditions. These results suggest that participants were motivated to respond faster to the pre-goal expectancy reward trials as compared to the other trial types. However, beta suppression did not relate to faster responses on the flankers task. Perhaps the influence of approach motivation on beta suppression relates more to action preparation, but not faster performance. Beta suppression, cognitive narrowing, and faster reaction times are all influenced by approach motivation, but beta suppression is related to cognitive narrowing only in approach-motivated pre-goal states. The relationship between beta suppression and cognitive narrowing in approach-motivated pre-goal states should be interpreted with caution because the relationship did not differ significantly from those in the other conditions. In addition, results suggest that greater beta suppression in the pre-goal reward condition was not the result of participants simply preparing to make a button press. Participants were preparing to make a button press in all conditions but did not show enhanced beta suppression in any condition except for the pre-goal expectancy reward condition. These results suggest that approach-motivated motor preparation enhances beta suppression beyond the suppression observed by general motor preparation.

The current study incorporated a measure of recall to assess cognitive scope. Consistent with past research using a surprise recall task after instructing participants to ignore the words, participants only remembered a small percentage of words (e.g., 4-10%; Baddeley, Lewis, Eldridge, & Thomson, 1984; DePrince & Freyd, 1999). Analyses did not find a relationship between cognitive narrowing and condition. However, Gable and Harmon-Jones (2010) assessed cognitive scope using recognition memory and found a narrowing of cognitive scope in positive pre-goal states. It is likely the current study did not replicate the effects observed in Gable and

Harmon-Jones (2010) because of the different assessments of memory. On a recall test, participants typically remember fewer words and remember words more slowly than on a recognition test (Nobel & Shiffrin, 2001). Based on the low recall rates using a surprise recall memory test, it may be that there was not enough variance in recall memory between conditions to replicate the three-way recognition memory effect observed by Gable and Harmon-Jones (2010).

The present study integrates research on motivation, memory, and neural correlates of motor-action preparation. Approach-motivated pre-goal states engage the same neural circuitry that drives motor-action preparation in general. Individual differences in activation of this circuitry related to greater narrowing of cognitive scope. Greater motor-action preparation and cognitive narrowing may enhance goal acquisition. Motor-action preparation facilitates movement and cognitive narrowing enhances focus on the goal. Together, these systems likely facilitate goal pursuit.

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Footnotes

[1]One-third ($n = 20$) of the reward expectancy trials resulted in no-gain. This was done to give participants the impression that achieving the reward was a result of their efforts, as opposed to the game being fixed. Also, one-third ($n = 20$) of the no-reward expectancy trials resulted in monetary gain. Participants were instructed at the beginning of the game that gains on these trials were unrelated to their reaction times. These two conditions were only included as unexpected occurrences to reduce the predictability of the game. Because of the reduced occurrence of these events, hypotheses were not generated for these conditions, and results were not included in analyses.

[2]Words used: pre-goal reward expectancy (utensil, ennui, scissors, quart, radiator, cord, cannon, stool, locker, violin, tower, stove, statue, stiff, chin, journal, passage, hat, patient, theory); pre-goal no-reward expectancy (hairdryer, busybody, context, pamphlet, vest, jug, curtains, knot, cork, tank, nonsense, taxi, corridor, sphere, pencil, finger, engine, metal, phase, month); post-goal reward feedback (hydrant, nonchalant, nun, reverent, appliance, ink, skeptical, ankle, hammer, concentrate, fork, spray, basket, bowl, patent, tool, chair, truck, glass, material); post-goal no-reward feedback (inhabitant, glacier, mantel, poster, swamp, blasé, banner, obey, indifferent, shy, fabric, statue, clock, reserved, stomach, odd, seat, column, serious, building).