

Research Article

Manic Thinking

Independent Effects of Thought Speed and Thought Content on Mood

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ABSTRACT—*This experiment found that the speed of thought affects mood. Thought speed was manipulated via participants' paced reading of statements designed to induce either an elated or a depressed mood. Participants not only experienced more positive mood in response to elation than in response to depression statements, but also experienced an independent increase in positive mood when they had been thinking fast rather than slow—for both elation and depression statements. This effect of thought speed extended beyond mood to other experiences often associated with mania (i.e., feelings of power, feelings of creativity, a heightened sense of energy, and inflated self-esteem or grandiosity).*

Most of us have had the experience of racing thoughts, and have felt the eagerness, urgency, and sense of wild exhilaration that accompany this rush of mind. The experience of racing thoughts, however, has been described primarily as a symptom of psychiatric illness—in particular, of mania (see American Psychiatric Association, 1994; World Health Organization, 1992). Although the manic experience is primarily characterized by feelings of elation, these feelings are almost always accompanied by fast thinking (Goodwin & Jamison, 1990; Young, Abrams, Taylor, & Meltzer, 1983). Drawing on the link between fast thinking and positive mood observed in clinical cases of mania, the present research concerns the possibility that increased thought speed may induce positive affect. In this experiment, thought speed was manipulated independently of thought content in order to examine the effects of speed on mood.

RACING THOUGHTS AND POSITIVE MOOD

Prior research has not explicitly examined the effects of thought speed on mood or on other subjective experiences. Research on processing fluency, however, has examined the consequences of

the speed with which people perceive and process stimuli, including consequences for mood (see Winkielman, Schwarz, Fazendeiro, & Reber, 2003, for a review). Studies suggest that faster processing elicits more positive mood, as indicated by self-report and by signs of smiling in the zygomaticus major muscle (Winkielman & Cacioppo, 2001). This effect is apparent even when increased processing speed is merely the result of repeated exposure (Harmon-Jones & Allen, 2001; Monahan, Murphy, & Zajonc, 2000), which suggests that accelerated perception may underlie mere-exposure effects (Kunst-Wilson & Zajonc, 1980; Zajonc, 1968), as well as the tendency to perceive prototypical stimuli as more attractive than other stimuli (Winkielman, Halberstadt, Fazendeiro, & Catty, 2006). Although processing fluency involves only relatively low-level cognition, it is interesting to note that its speed seems to elicit positive responses.

Research on the effect of music tempo on mood and cognition is also relevant. This research has found that music with a faster tempo is perceived as more happy, and is more likely to induce positive mood and arousal, than music with a slower tempo (Gagnon & Peretz, 2003; Husain, Thompson, & Schellenberg, 2002; Rigg, 1940). Although it is not clear that listening to fast music speeds up cognition, because that question has not been studied, there is some indication that listening to fast music improves performance on certain cognitive problems—as suggested by research on the “Mozart effect” (e.g., Thompson, Schellenberg, & Husain, 2001; Twomey & Esgate, 2002). Slow music, by comparison, is thought to induce depressive mood, and studies have commonly employed slow music as a negative-mood manipulation (Clark, 1983).

Our hypothesis regarding a causal effect of thought speed on mood derives from the observed link between these two variables in clinical cases of mania. This link leads us to hypothesize further that fast thinking will also induce a number of other states also experienced during mania (e.g., delusions of grandeur, increased energy and activity, and feelings of unusual power, creativity, and inspiration; American Psychiatric Association, 1994, p. 328). Again, some hints of this possibility come

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from past research. For example, mania is often characterized by overactivity and decreased sleeping, and research on insomnia suggests an effect of fast thinking on these symptoms. Specifically, presleep racing thoughts appear to be a common precursor of insomnia (Harvey, 2002). Another symptom of mania involves the subjective feeling, and even the actual manifestation, of creativity (Andreasen, 1987; Jamison, 1993). Although no research has directly examined effects of thought speed on actual or perceived creativity, research on creativity suggests that it is hampered by factors that prevent rapid thought progression, such as evaluative considerations (Amabile, 1979; Bartis, Szymanski, & Harkins, 1988) and forced pauses in brainstorming (Nijstad, Stroebe, & Lodewijkx, 2003).

THE PRESENT RESEARCH

The primary hypothesis of the present research is that speed of thinking can cause changes in mood, such that faster thinking will induce more positive mood. To test this hypothesis, we conducted an experiment in which we manipulated thought speed and observed the effects of that manipulation on mood; this design allowed us to examine this influence independent of the valence of thought content. We also sought to test whether this thought-speed manipulation would affect other variables, such as grandiosity and feelings of energy, associated with the manic experience. A 2×2 (Thought Speed \times Thought Valence) design was used in order to examine the effects of thought speed on mood, as well as the effects of mood-related thought content on mood.

The content of participants' thoughts was manipulated by using a well-known procedure designed to induce "elated" or "depressed" mood (Velten, 1968). We then independently examined the effects of this manipulation and the effects of a thought-speed manipulation produced by altering the speed with which participants experienced the thought content. Our primary prediction was that thought speed and thought content would have independent main effects on mood. That is, thought speed was expected to have its own direct influence on positive mood, rather than to serve merely to intensify the affective influence of mood-relevant thought content. Thinking sad thoughts at manic speed, we predicted, would induce positive mood and other symptoms of mania.

METHOD

Participants

A total of 144 Princeton University undergraduates (66 females and 78 males) participated in exchange for course credit or pay. Participants were run individually and were randomly assigned to one of four conditions: fast thought, elation statements, $n = 40$; fast thought, depression statements, $n = 33$; slow thought, elation statements, $n = 37$; slow thought, depression statements, $n = 34$.

Procedure

Upon arriving at the experimental session, participants provided written consent to participate in the study, and their baseline mood was assessed, as a possible covariate, via self-ratings on the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). No differences in baseline mood were observed between conditions, and thus all results are reported without using PANAS score as a covariate; using it as a covariate did not affect the statistical significance of our results. After completing the PANAS, participants were seated at a computer console and received the following instructions from the experimenter:

Once you get started, you will see a series of statements presented one word at a time on the screen. Read each word of each sentence aloud as it appears. Don't worry if it takes you a few sentences before you get used to it. If it's okay with you, I'm also going to tape-record this for our records. Okay, I'll stay here until you get the hang of it, and then I'll come back when you're done with this part of the study. When you're ready to begin, click the mouse once, and the study will begin. And remember, as soon as words start to come up on the screen, you should be reading them.

Content Manipulation

The statements that participants read were adapted from Velten's (1968) procedure for mood induction, in which participants read a series of 60 statements that become increasingly elating or depressing in content (depending on condition). In both induction conditions, the first mood-induction statement that participants read was affect-neutral (i.e., "Today is no better or worse than any other day"), the second statement had a slight affective tone (i.e., "I *do* feel pretty good today though" vs. "However, I feel a little low today"), and the final statement had a strong affective tone (i.e., "Wow! I feel great!" vs. "I want to go to sleep and never wake up"). The following changes to Velten's original procedure were made: (a) An outdated statement about the Vietnam War was eliminated from the depression induction, along with the same-numbered statement from the elation induction. (b) One statement from each set that directly addressed thought speed was eliminated (i.e., "My thinking is clear and rapid" vs. "My thoughts are so slow and downcast—I don't want to think or talk"). (c) The phrase "industrious as heck" was replaced with "so industrious," and a religious exclamation was replaced with "Wow!"

Both induction conditions began with five statements of neutral content (e.g., "This review is concerned with the first three volumes"), also from Velten, that were included to help participants familiarize themselves with the task. Participants were not explicitly told that they should experience an elated or depressed mood because such instructions have been criticized for introducing a demand characteristic and are not required for producing the Velten effect (see Larsen & Sinnett, 1991).

Speed Manipulation

Participants were exposed to the statements via timed presentation controlled by Microsoft PowerPoint. Each statement

scrolled into view one letter at a time in large print (Arial 44-point font), until it finally appeared at full length in the middle of the screen. Once participants clicked the mouse to begin the study, the slides—each containing one Velten statement—advanced automatically at a speed of 40 ms per letter (with an additional 320 ms between slides) for the fast-thought conditions and 170 ms per letter (with an additional 4,000 ms between slides) for the slow-thought conditions. As a check on the appropriateness of these speeds, three undergraduates read the statements aloud so that we could determine normal reading speed (in our sample) for the statements. These participants read the statements at an average of 80 ms per letter (range: 69–86 ms per letter). This suggests that our fast conditions (40 ms per letter) were roughly twice as fast as the normal reading speed for our participants, and our slow conditions (170 ms per letter) were roughly twice as slow as their normal reading speed.

To ensure that participants read all of the statements, the experimenter stayed in the room for the first several statements and informed participants that their speech was being recorded (which it was, for this purpose). After completing this phase of the study, participants were given a packet of dependent measures to complete. Finally, they were thanked and debriefed.

Dependent Measures

Perceived Thought Speed

The participants' questionnaire packet began by asking them to assess their speed of thinking: "Sometimes people have the feeling that their thoughts are coming slowly, and other times people feel that their thoughts are 'racing.' What did you feel was the speed of your thoughts, as you were reading the statements on the computer screen?" This question was answered on a 9-point scale, anchored at 1 (*very slow*), 5 (*moderate speed*), and 9 (*very fast*).

Positive Mood

Three items assessed positive mood by asking participants to rate how much they currently felt excited, enthusiastic, and happy (1 = *very slightly*, 3 = *a little*, 5 = *moderately*, 7 = *quite a bit*, 9 = *extremely*). Reliability for the summed items was good (Cronbach's $\alpha = .77$).

Other Variables Associated With Mania

A five-item composite assessed participants' experience of *energy* by asking them to rate how much they currently felt alert, jittery, tired (reverse-scored), attentive, and active (Cronbach's $\alpha = .68$). Three items assessed participants' *feelings of power*, asking them to rate how much they currently felt strong, powerful, and determined (Cronbach's $\alpha = .73$). Feelings of *creativity and inspiration* were assessed with three items that asked participants to rate how much they currently felt creative, insightful, and inspired (Cronbach's $\alpha = .75$). For each of these measures, participants provided their responses on 9-point scales (1 = *very slightly*, 3 = *a little*, 5 = *moderately*, 7 = *quite a*

bit, 9 = *extremely*). Two additional measures were included to assess grandiosity or inflated self-esteem. The first was the State Self Esteem Scale (Heatherton & Polivy, 1991). The second was a subset of high-loading items from the recently developed State-Trait Grandiosity Scale, designed specifically to assess grandiosity (Rosenthal, Hooley, & Steshenko, 2003). This measure asks participants to rate how they are feeling "at the present moment" along 20 different dimensions classified into subscales for Power (envied, extraordinary, glorious, of high status, larger than life, omnipotent, perfect, powerful, prominent, and superior) and Charisma (attractive, beautiful, charismatic, charming, desired, important, influential, interesting, outstanding, and willing to take risks); response options are anchored at 1 (*not at all*) and 7 (*extremely*).

Participants also responded to a three-item measure (distressed, hostile, irritable) of current negative mood (1 = *very slightly*, 3 = *a little*, 5 = *moderately*, 7 = *quite a bit*, 9 = *extremely*; Cronbach's $\alpha = .79$). We had no predictions for this measure because our hypotheses derived from the manic profile, and negative mood occurs in some manic states, in which irritability is present, but is contrary to the experience of other manic states, for which elation is the predominant mood. The dependent measures were presented in a fixed order.

RESULTS

The data were analyzed in a series of 2×2 (Thought Speed \times Thought Valence) analyses of variance. Figure 1 presents the means for each cell.

Perceived Thought Speed

The experimental manipulation of thinking speed proved successful. Participants assigned to the conditions designed to induce faster thinking reported thinking faster than those assigned to the conditions designed to induce slower thinking, $F(1, 141) = 38.72$, $p < .0001$, $p_{\text{rep}} > .99$, $\eta^2 = .23$. No other effects were present.

Positive Mood

Our primary hypothesis was that the manipulated speed of thoughts would affect mood, such that faster thinking would induce more positive mood. As predicted, participants in the fast-thinking conditions displayed more positive mood than participants in the slow-thinking conditions, as evidenced by a main effect of the thought-speed manipulation, $F(1, 141) = 11.40$, $p = .0009$, $p_{\text{rep}} = .99$, $\eta^2 = .07$. Furthermore, this effect was mediated by participants' subjective experience of their thought speed. Thought-speed condition affected perceived thought speed, $B = 2.08$, $SE = 0.33$, $p < .0001$; perceived thought speed affected positive mood, $B = 0.30$, $SE = 0.07$, $p < .0001$; and, according to the Sobel test advocated by Baron and Kenny (1986), perceived thought speed mediated the

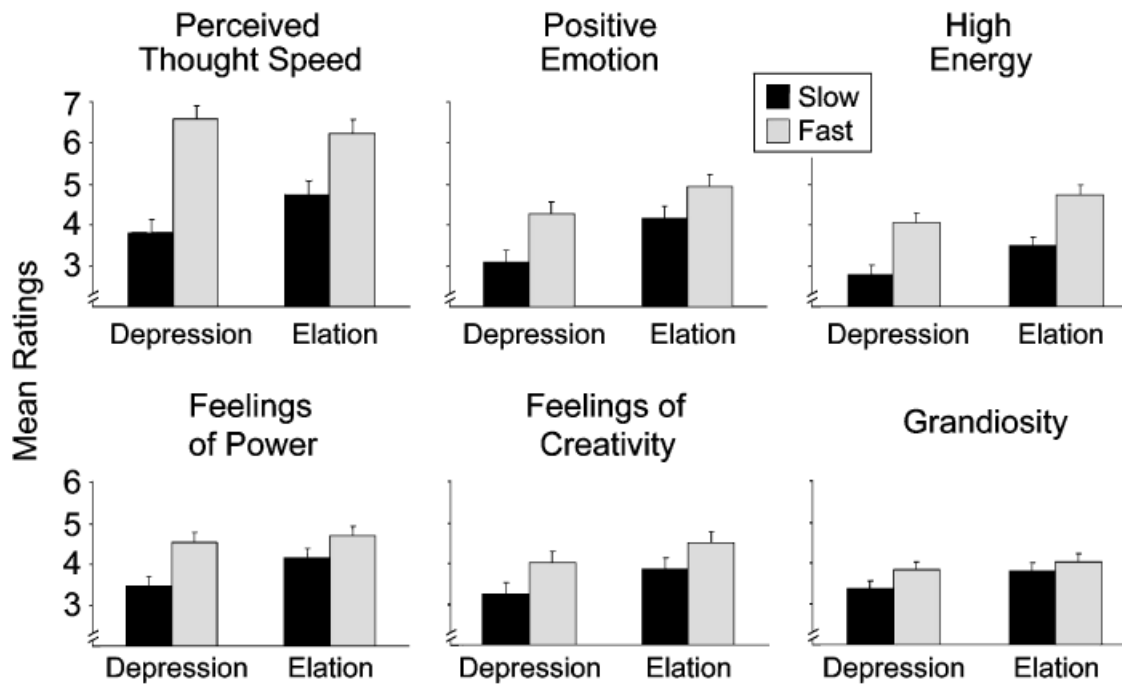


Fig. 1. Means by experimental condition (depression-related vs. elation-related statements, slow vs. fast thinking). Ratings were on a scale from 1 to 9 (except for grandiosity, which was rated on a scale from 1 to 7). Error bars indicate 1 *SE* above the mean.

relation between thought-speed condition and positive mood, $Z = 2.81, p = .005$.

Consistent with Velten's (1968) original mood-induction findings, the results also indicated that the valence of participants' thought condition affected positive mood. Participants in the elation conditions showed more positive mood than those in the depression conditions, as evidenced by a main effect of the valence of the thought statements, $F(1, 141) = 9.30, p = .003, p_{rep} = .98, \eta^2 = .05$. There was no interaction effect of thought valence and thought speed. Thought speed had an effect on positive mood among both participants exposed to elation-related content, $F(1, 76) = 3.89, p = .05$, and participants exposed to depression-related content, $F(1, 66) = 8.11, p = .006$.

Other Variables Associated With Mania

Across the elation and depression conditions, participants who thought faster displayed more characteristics associated with the manic experience. Participants who were induced to think fast rated themselves as having more energy than participants who thought at a slower speed, $F(1, 141) = 27.62, p < .0001$. They also felt more powerful, $F(1, 141) = 11.25, p = .001$, and more creative and inspired, $F(1, 141) = 6.61, p = .01$. Participants did not report higher self-esteem in the fast-thought condition (although the means were in the expected direction), $F(1, 141) = 1.94, p = .17$, but they did tend to be more grandiose in that condition, $F(1, 141) = 3.20, p = .07$. Furthermore, the subjective experience of fast thinking mediated the significant effects of

thought-speed condition on feelings of energy, $Z = 2.26, p = .02$; power, $Z = 3.26, p = .001$; and creativity, $Z = 3.02, p = .003$; and on the experience of grandiosity, $Z = 3.30, p = .001$.

Additionally, there were main effects of thought content, such that participants who read elation-related statements appeared to be having a more manic experience than those who read depression-related statements. Participants in the elation-content conditions reported more energy, $F(1, 141) = 8.21, p = .005$; a tendency toward more feelings of power, $F(1, 141) = 3.10, p = .08$; and more feelings of creativity, $F(1, 141) = 4.01, p = .05$. They did not report experiencing significantly higher state self-esteem, $F(1, 141) = 2.63, p = .11$, or grandiosity, $F(1, 141) = 2.55, p = .11$, compared with participants in the depression-content conditions.

Negative Mood

Finally, we examined effects of thought speed and of thought valence on negative mood (i.e., feelings of distress, hostility, and irritability). As already noted, no predictions about the effects of thought speed on these negative feelings were made, because our predictions derived from clinical cases of mania, for which these characteristics are sometimes, but not always, observed. No effect of thought speed on negative mood was found, $F(1, 141) = 0.83, p = .36$. Not surprisingly, there was an effect of thought content on negative mood, with participants in the depression conditions displaying more negative affect than those in the elation conditions, $F(1, 141) = 4.62, p = .03$. There was no interaction effect.

DISCUSSION

In this experiment, we obtained direct evidence for our hypothesis about the relation between thought speed and positive mood by manipulating thought speed and measuring subsequent mood. Regardless of whether participants were led to think increasingly depressing thoughts or increasingly elated thoughts, they displayed more positive mood—and more related “symptoms” characteristic of the manic experience—when they had these thoughts at a faster speed. In fact, the manipulation of thought speed had at least as strong an impact as the classic Velten mood manipulation designed (and previously demonstrated) to induce precisely those effects (Velten, 1968; for reviews, see Kenealy, 1986, and Larsen & Sinnott, 1991).

Our results indicate that these effects of thought speed are mediated by individuals’ subjective feeling that they are thinking fast. This finding is worthy of note given that the “subjective experience that thoughts are racing” is one of the key criteria for diagnosing a manic episode, according to the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV; American Psychiatric Association, 1994, p. 332). Despite this diagnostic emphasis, the narrative description of mania offered by the DSM-IV also alludes to actual (rather than perceived) fast thinking: “the individual’s thoughts may race, often at a faster rate than can be articulated” (p. 329). It seems that the experience of racing thoughts involves the feeling of fast thinking during the actual experience of fast thinking.

This idea of literally feeling one’s own rapid thinking could belong to the category of “cognitive feelings” (Clore, 1992), which primarily involve cognition rather than valence or affect. Such feelings, like more affective reactions, can be used as information for making judgments (see also Schwarz et al., 1991; Schwarz & Clore, 1983). In his discussion of meta-cognitive experiences of accessibility, Schwarz (2004) suggested that the experience of having many (vs. few) thoughts come to mind, or of processing stimuli with ease rather than with difficulty, is likely to have consequences for the actor that will depend on the actor’s naive theory about those cognitive experiences. Along these lines, the present research suggests that if one believes that the mind races when one is happy, energetic, and feeling good about oneself, then one may report those sentiments in response to the experience of racing thoughts.

Participants in this study reported more positive affect in response to fast thinking than in response to slow thinking, but thought speed was not associated with any differences in negative affect. This result is consistent with clinical portraits of mania, which typically involve positive affect (i.e., elation), but are more variable in their inclusion of negative affect (i.e., irritability and anger). This result is also consistent with both theory and evidence indicating that processing fluency affects positive but not negative mood (Winkielman & Cacioppo, 2001).

Another theoretical concern informed by the present results involves the mood effects of processing negative stimuli. One

possible consequence of thinking quickly about affective stimuli is that the effects of those stimuli will be intensified. Thus, processing negative stimuli quickly might lead to increased negative affect. An alternative is that thinking quickly induces more positive affect regardless of stimulus valence. In this case, processing even negative stimuli quickly would lead to increased positive affect. Although no prior research has examined this question directly, research on affective responses to repeated mere exposure (which induces faster processing) has revealed both increases in positive affect (Zajonc, Markus, & Wilson, 1974) and increases in negative affect (Brickman, Redfield, Harrison, & Crandall, 1972; Grush, 1976). The current research adds new insight to this theoretical debate by suggesting that thinking quickly rather than slowly about negative self-statements leads to more positive affect, rather than to intensification of negative affect.

IMPLICATIONS FOR THE STUDY AND TREATMENT OF MANIA AND DEPRESSION

The current research holds theoretical implications for the disciplines of clinical psychology and psychiatry, in which mania and bipolar disorder (or “manic-depression”) have generally been understood in terms of the mood states associated with them. The DSM-IV divides major psychiatric disorders into two main categories: affective (or mood) disorders, which include mania, and thought disorders, which include schizophrenia (American Psychiatric Association, 1994). But our findings suggest that the various symptoms associated with mania may, at least sometimes, be spurred on by racing thoughts rather than positive mood. Indeed, the current study raises the question of whether mania may originate as more of a thought disorder than a mood disorder.

If accelerated thinking leads to experiences associated with mania, might decelerated thinking lead to experiences associated with depression? A brief examination of the criteria for a depressive episode supports the idea of a link between depression and decelerated thinking: Whereas racing thoughts are a criterion for diagnosing a manic episode, “diminished ability to think” is a criterion for diagnosing a depressive episode (American Psychiatric Association, 1994, p. 327). Indeed, the results of the present experiment could also be looked at in this light. Our participants who were induced to think relatively slowly appear to have responded with various psychological reactions associated with depression: decreased positive affect, decreased energy, diminished feelings of self worth, and perceived powerlessness.

Finally, this research offers the promise of practical application in both clinical and nonclinical populations. Perhaps simple manipulations of thought speed may serve to improve individuals’ mood, self-esteem, feelings of creativity, feelings of power, and energy level. Prior research has demonstrated the positive effects of engaging in rapid activity (i.e., aerobic

exercise) on mood and depressive symptomatology (e.g., Emery & Blumenthal, 1991; McCann & Holmes, 1984); the current research suggests that similar effects may occur for rapid thinking. Thus, interventions that are designed to influence perceptions of one's own thought speed might be useful additions to the current cognitive-behavioral therapies that emphasize thought content in treating mood disorders (e.g., Beck, Rush, Shaw, & Emery, 1979). The results of this experiment suggest the intriguing possibility that even during moments when people feel stuck having depressed thoughts, interventions that accelerate the speed of such thoughts may serve to boost feelings of positive affect and energy.

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