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The theory of MindTime: The relationships between Future, Past, and Present thinking and psychological well-being and distress

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ABSTRACT

Based on recent advances in cognitive and comparative psychology, we posit that the arguably unique human ability to decouple primary mental representations from the present moment and place them into different temporal localities (i.e., form secondary mental representations of objects) as well as the ability to form higher-order mental representations of secondary representations (meta-representations) gave rise to the development of three distinct patterns of thinking: Future thinking, Past thinking, and Present thinking. Moreover, we posit that measurable individual differences exist in the extent to which each of the three thinking perspectives are utilized and that such differences influence the manifestation and expression of personality and well-being. In this study, five hundred eighty participants completed the TimeStyle Inventory and measures of resiliency, optimism, cynicism, anxiety, and depression. Our results indicated that Future, Past, and Present thinking correlated as hypothesized and shared unique variance with the dependent variables. Our findings support the theory of MindTime and have implications for personality theory and stress research.

1. Introduction

In recent years, researchers have proposed that experiences of psychological, emotional, and physical well-being are influenced by personality traits. For example, Scheier and Carver (1985, 1992) proposed that optimistic individuals tend to manifest positive health outcomes and lower levels of health strains than pessimistic individuals; Ryff and Singer (2003) suggested that resilient individuals are able to maintain generally positive mental and physical health and recover from stressful life events easily; and Kobasa (1979) proposed that hardy individuals tend to view unexpected life changes as opportunities and challenges for exploration and growth rather than as threats to one's well-being. Similarly, Watson and associates (e.g., Watson & Clark, 1984; Watson & Tellegen, 1985) proposed that two higher-order individual difference variables – negative affectivity (NA) and positive affectivity (PA) – account for shared variance in scores on measures of subjective experiences of emotionality, personality, and psychological health.

In this paper, we present an alternative, but not mutually exclusive, approach regarding individuals' well-being, emotionality, and stress reactivity. Specifically, we posit that the manner in which individuals process information and utilize their cognitive skills (e.g., thinking perspective) influences the extent to which they manifest a positive versus negative life outlook (e.g., optimism, resilience, cynicism) or experience psychological distress (e.g., anxiety, depression).

1.1. Mental time travel, construal-level theory, and the theory of MindTime

1.1.1. Mental time travel

According to Suddendorf and associates (e.g., Suddendorf, 1999; Suddendorf & Corballis, 1997, 2007), approximately 1.5 million years ago ancestors of modern humans developed the ability to (a) dissociate mentally from primary perceptions and represent real world objects symbolically, (b) decouple primary representations from the present and place them into different temporal locations (i.e., form secondary representations of objects), and (c) develop symbolic representations (meta-representations) of the relationships among secondary representations. The ability to entertain multiple representations of an object and be able to do so simultaneously allowed for the creation of a new level of mental executive control over actions, referred to as 'meta-mind' (Suddendorf, 1999). As summarized by Suddendorf (1999), the concept of meta-mind includes the reflective self-referencing of the 'inner eye', the ability to understand, reflect on, and predict the mental

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states of others, the ability to develop action plans and strategies, the mental governance of one's own behavior, self-awareness, and mental time travel.

Mental time travel has been defined as the ability to mentally project oneself forwards and backwards in time to either imagine future possibilities or recall past experiences and stored knowledge (e.g., Suddendorf & Corballis, 1997). Mental time travel involves the meta-mind's ability to (a) mentally disengage from the present moment, (b) actively reconstruct both past and future events based on the information contained in both episodic and semantic memory (e.g., Suddendorf, 1999; Tulving, 1993; Tulving, 2005), and (c) temporally locate those reconstructions as belonging to the past or to the future.

1.1.2. Construal-level theory

The ability to engage in mental time travel is also a fundamental characteristic associated with how individuals form mental representations of events and objects. According to construal-level theory (CLT: Liberman & Trope, 1998; Trope & Liberman, 2003, 2010), the characteristics of the mental representations that individuals form of events and objects depend on the temporal distance in which those events and objects are imagined. The greater the temporal distance – the greater the time frame an event or object is imagined to exist in time, either into the future or into the past – the more likely events will be represented abstractly. Mental representations of events that are imagined to exist in the distant future tend to consist of decontextualized features that convey the essence and meaning of the event (high-level construals), whereas mental representations of events located in the near-term tend to be concrete, contextualized, and consist of peripheral and incidental details of the event (low-level construals). Research has supported the basic propositions of construal-level theory (see Trope & Liberman, 2003 for a review of this literature). In summary, the greater the temporal distance, the more likely that individuals will (a) represent events in terms of abstract, rather than concrete, features; (b) classify objects into broad, rather than specific, categories; (c) organize preferences into simple versus concrete structures; (d) form generalized, higher-level, superordinate goals compared to specific, subordinate low-level goals; (e) focus on the desirability of outcomes rather than the feasibility of outcomes; and (f) demonstrate higher levels of creativity and insight.

We note that in the empirical research conducted by Trope, Liberman, and associates (e.g., Förster, Friedman, & Liberman, 2004; Liberman & Trope, 1998; Trope & Liberman, 2003, 2010), temporal distance is manipulated by instructing participants to imagine either (a) performing the experimental task "one year from now" (distal future temporal perspective) or (b) performing the experimental task "tomorrow" (near-term temporal perspective). Thus, a simple experimental induction of a distal versus near-term temporal perspective has been shown to elicit a processing shift toward abstract mental representation (e.g., Trope & Liberman, 2003). Therefore, it follows that individuals who are predisposed to process events with a distal temporal perspective will likely form abstract mental representations of events and objects, whereas individuals who are predisposed to process events with a near-term temporal perspective are likely to form concrete mental representations of events. Consequently, we posit that differences exist in the manner in which individuals are predisposed toward having Future, Past, and Present temporal perspectives, thinking perspectives that, in turn, influence the manner in which individuals form mental representations of events and objects.

1.1.3. Theory of MindTime

As discussed in Sections 1.1.1 and 1.1.2, research in cognitive and comparative psychology has indicated that human beings have the ability to decouple primary representations from the present moment and place them into different temporal locations. In addition, human beings have the ability to form mental representations (meta-representations) of secondary representations (e.g., Suddendorf, 1999). In turn, the perceived temporal distance of events and objects has been shown to influence the mental representations that individuals form of those events and objects (e.g., Trope & Liberman, 2003). According to our theory of MindTime (Fortunato & Furey, 2009, 2010; Furey, 1994; Furey & Stevens, 2004), three distinct patterns of thinking exist: Future thinking, Past thinking, and Present thinking. Moreover, we posit that (a) the mental representations that individuals form of objects and events are influenced by each of the three thinking perspectives, (b) measurable individual differences exist in the extent to which each of the three thinking perspectives are utilized; and (c) the extent to which individuals utilize the three thinking perspectives, separately and in combination, influences the manner in which they perceive and interact with the world and others.

1.2. The three thinking perspectives

1.2.1. Future thinking

According to Suddendorf (1999), mental time travel into the future provided human beings with the ability to creatively imagine an infinite set of hypothetical future possibilities, which in turn provided individuals with the cognitive flexibility to foresee and adapt to ever-changing environmental circumstances (e.g., Suddendorf & Busby, 2005). According to CLT (Liberman & Trope, 1998), the greater the temporal distance of events and objects, the more likely they will be represented abstractly. Having a distal future temporal perspective has been shown to increase creative thinking (Förster et al., 2004) and the perceived feasibility of outcomes, which in turn has been hypothesized to increase individuals' general level of optimism (Liberman & Trope, 1998). Thus, according to the theory of MindTime, individuals who are predisposed to process events with a distal future temporal perspective are those who tend to form abstract mental representations, particularly about distal future events, and engage in creative, visionary, and optimistic thinking.

Future thinking, therefore, refers to the pattern of thinking associated with the ability to mentally time travel into the future, form abstract mental representation of future events, creatively imagine future possibilities, and combine and recombine mental representations generatively into virtually infinite numbers of novel sequences (Suddendorf & Corballis, 1997). We believe that individual variation in Future thinking manifests as: (a) visionary, speculative thinking; (b) creative problem solving; (c) the perception of new environmental opportunities; (d) an openness to new experiences and change; (e) flexibility and adaptability; (f) quick decision making; (g) a hopeful, optimistic outlook on life; social gregariousness; (h) and a present time orientation (defined as having an orientation toward engaging in hedonistic and opportunistic activities: e.g., Zimbardo & Boyd, 1999).

Previous research has shown that scores on Future thinking correlated positively with scores on measures of extraversion, openness, and present time perspective (Fortunato & Furey, 2009, 2010). Based on the above, we hypothesize that Future thinking will correlate positively with scores on measures of resiliency and optimism and negatively with scores on cynicism, anxiety and depression.

1.2.2. Past thinking

Mental time travel into the past provided human beings with the ability to access past experiences and knowledge stored in episodic and semantic memory (e.g., Tulving, 1985) and the subsequent reconstruction, analysis, and critical evaluation of that information as to its perceived relevance to current environmental,

social, and personal contingencies. Mental time travel into the past provided individuals with the ability to consciously access information stored in memory, differentiate between relevant and irrelevant experiences and knowledge and then to select those experiences that best serve to minimize risks involved when interacting with current and anticipated environmental and situational events. Thus, according to the theory of MindTime, individuals who are predisposed to process events with a distal past temporal perspective are those who will form abstract mental representations, particularly about past events.

Past thinking, therefore, refers to the pattern of thinking associated with the ability to mentally time travel into the past, access past experiences and knowledge stored in memory, and form abstract mental representations of those experiences and stored knowledge. We believe that individual variation in Past thinking manifests as: (a) a propensity to engage in reflection, contemplation, and information gathering; (b) slow and thoughtful decision making; (c) sensitivity to the presence of negative environmental stimuli; (d) a cautious, cynical outlook on life; and (e) a propensity for having a past time orientation (e.g., Lewin, 1942; Zimbardo & Boyd, 1999). Previous research has shown that scores on a measure of Past thinking correlated positively with scores on measures of neuroticism and both positive and negative past orientation and negatively with scores on measures of extraversion and agreeableness (Fortunato & Furey, 2009, 2010). Based on the above, we hypothesize that Past thinking will correlate positively with scores on measures of depression, anxiety, and cynicism and negatively with scores on resiliency and optimism.

1.2.3. Present thinking

Present thinking refers to the pattern of thinking associated with the ability of the conscious mind to organize its own actions and mental states as well as manipulate the environment. The adaptive advantage of Present thinking is in the ability to control one's environment. According to CLT (Liberman & Trope, 1998), the closer the temporal distance of events and objects (i.e., near-term), the more likely they will be represented concretely. In addition, when events and objects are temporally localized in the near-term, individuals tend to focus on the means of goal attainment, rather than the goals themselves. According to the theory of MindTime, individuals who are predisposed to process events with a near-term (or present) temporal perspective will tend to form concrete mental representations and focus on the actions needed to achieve one's goals. Thus, Present thinking occurs when individuals integrate and organize the products of Past and Future thinking in order to organize data and information into pre-existing schemas, develop action plans based on that information, and organize resources to achieve those plans by the most efficient means possible.

Present thinking, therefore, refers to the pattern of thinking associated with the ability to form concrete mental representations of events and object, organize its own actions and mental states, and manipulate the environment. We believe that individual variation in Present thinking manifests as: (a) a propensity to organize, plan, and structure one's environment and activities; (b) the tendency to adopt and maintain predefined social and personal schemas; (c) practical decision making; (d) the desire for stability, harmony, and the maintenance of good relations with others; and (e) a propensity for having future time orientation (e.g., defined as having an orientation toward planning for future life events: Zimbardo & Boyd, 1999). Previous research has shown that Present thinking correlated positively with measures of conscientiousness and future time perspective (Fortunato & Furey, 2009, 2010). In this study, we hypothesize that Present thinking will correlate positively with resiliency and optimism, and negatively with cynicism, anxiety, and depression.

2. Method

2.1. Participants and procedure

Five hundred and eighty-six undergraduate students from a medium sized northwestern university participated in this study in partial fulfillment of a general psychology research requirement. Participants made appointments on-line using the department's on-line subject pool registration and sign-up web site. Questionnaire administration took place over the course of a single semester in a designated classroom. The data from six participants were removed from the data set because they did not complete the survey. Of the remaining participants, women comprised 49.8% of participants; 3.6% did not provide their sex. Caucasians comprised 82.9% of participants; 3.7% were African–American; 7.5% were Hispanic; 3.1% were of Asian descent; .5% were Native American; and 2.3% indicated 'other'. Average age of participants was $M = 22.61$ years old.

Subsequent to electronic conversion of the data, a manual search of the dataset indicated several instances of missing data (i.e., no response to a survey item). In these instances, we used the mean imputation approach (Byrne, 2001). Specifically, we computed the arithmetic average of the set of items associated with the specific scale in which missing data existed, then input the imputed value for the missing data.

2.2. Measures

Thinking perspective was measured using a 34-item version of the TimeStyle Inventory. Examples of the 13-item Future thinking scale are "People think of me as a visionary" and "I am known for invention/innovation." Examples of the 14-item Present thinking scale are "People think of me as organized," and "I am known for getting things done." Examples of the 7-item Past thinking scale are "I like to reflect on 'what was'" and "Past experiences strongly inform my decision making." Items were scored on a 7-point Likert scale (1 = strongly disagree; 7 = strongly agree). Coefficient alpha estimates of reliability for scores on the Future, Present, and Past thinking scales were .88, .91, and .84, respectively.

Resiliency was measured with Neill and Dias' (2001) 15-item revised version of Wagnild and Young's (1993) Resilience Scale. Optimism was measured using Scheier and Carver's (1985) 6-item Life Orientation Test. Cynicism was measured using the 8-item Cynical Distrust Scale, derived from the Cook-Medley Hostility Scale (Cook & Medley, 1954). Anxiety and depression were both measured using 6-item scales taken from the Brief Symptom Inventory (Derogatis, 1993). Coefficient alpha estimates of reliability were .91, .82, 84, .80, and .88, for scores on resiliency, optimism, cynicism, anxiety, and depression, respectively.

3. Results

Pearson product moment correlation coefficients were computed to assess the relationships between scores on the TimeStyle Inventory and scores on resiliency, optimism, cynicism, anxiety and depression (see Table 1). First, scores on Future thinking correlated positively with scores on optimism and resiliency and negatively with scores on anxiety and depression. Second, scores on Past thinking correlated positively with scores on cynicism, anxiety, and depression and negatively with scores on resiliency and optimism. Third, scores on Present thinking correlated positively with scores on resilience, optimism and negatively with scores on cynicism, anxiety, and depression. Thus, our hypotheses were supported.

Table 1
Means, standard deviations and correlation coefficients among measured variables, $N = 580$.

	Mean	SD	1	2	3	4	5	6	7	8
1. Future thinking	4.92	.79	(.91)							
2. Past thinking	4.89	1.06	−.01	(.85)						
3. Present thinking	5.27	.92	.16*	.27**	(.91)					
4. Resiliency	5.63	.86	.47**	−.14**	.40**	(.91)				
5. Optimism	4.68	1.12	.25**	−.34**	.24**	.57**	(.82)			
6. Cynicism	3.79	1.13	−.07	.24**	−.09*	−.23**	−.46**	(.84)		
7. Anxiety	2.03	.79	−.09*	.25**	−.09*	−.29**	−.30**	.14**	(.80)	
8. Depression	2.11	.97	−.16*	.31**	−.17**	−.41**	−.42**	.26**	.70**	(.88)

Note: Coefficient alpha estimates of reliability are in parentheses on the diagonal.
* $p < .05$.
** $p < .01$.

In addition, multiple regression analyses were computed to determine whether Future, Past, and Present thinking, in combination, would differentially share variance with scores on the other scales. As shown in Table 2, (a) all three thinking perspectives shared unique variance in scores on resiliency and optimism (Future and Present thinking, positively; Past negatively) as well as depression (Future and Present thinking, negatively; Past thinking, positively); (b) Past thinking (positively) and Present thinking (negatively) shared unique variance in scores on anxiety; and (c) only Past thinking (negatively) shared unique variance in scores on cynicism.

4. Discussion

In this study, we examined the relationships between Past, Future, and Present thinking on measures of well-being and strain. As noted in Section 3, scores on measures of Future, Past, and Present thinking correlated differently, and as hypothesized, with scores on measures of resiliency, optimism, cynicism, anxiety, and depression. In addition, we examined the extent to which Future, Past, and Present thinking, in combination, shared unique variance in scores on measures of resiliency, optimism, cynicism, anxiety, and depression. According to the theory of MindTime, the extent to which individuals utilize the three thinking perspectives influences how they perceive and interact with the world and others. Our findings are consistent with this aspect of the theory. On three of the dependent variables (resiliency, optimism, and depression), all three thinking perspectives shared unique variance with scores on measures of the variables; On one of the dependent variables (anxiety), scores on two of the thinking perspectives (Past and Present thinking) shared unique variance with scores on the anxiety measure. These findings are also consistent with previous research. For example, Fortunato and Furey (2009) reported that scores on measures of Future, Past, and Present thinking, in combination, shared unique variance in scores on measures of the Big Five personality triats. Similarly, Fortunato and Furey (2010) reported that scores on measures of Future, Past, and Present thinking, in combination, shared unique variance in scores on the five dimensions of Zimbardo and Boyd's (1999) Time Perspective Inventory. Thus, our findings extend previous research and provide evidence supportive of our theoretical model. In addition, the findings from this study also provide further evidence for the construct validity of the TimeStyle Inventory.

4.1. Implications and directions for future research

In recent years, Watson and associates (e.g., Watson & Clark, 1984; Watson, Clark, & Tellegen, 1988; Watson & Tellegen, 1985; Watson, Wiese, Vaidya, & Tellegen, 1999) proposed that two higher-order individual difference variables – positive affectivity (PA) and negative affectivity (NA) account for much shared variance in individuals' baseline levels of stress and well-being as well as their reactivity to positive and negative environmental stimuli. Moreover, based on the work of Gray (1970, 1982), Depue and associates (Depue & Iacono, 1989; Depue, Krauss, & Spoont, 1987), and Fowles (1987), Watson et al. (1999) suggested that NA and PA are the subjective correlates of two biophysiological motivational systems. On the one hand, NA is viewed as the subjective correlate of a behavioral inhibition system (BIS: Depue & Iacono, 1989; Fowles, 1987; Gray, 1970, 1987), conceptualized as a motivational avoidance system that mediates negatively oriented emotional and behavioral responses in response to negative environmental stressors. On the other hand, PA is viewed as the subjective correlate of a behavioral activation system (BAS: Fowles, 1987; BFS: Depue & Iacono, 1989), conceptualized as a motivational approach system that mediates positively oriented emotional and behavioral responses in response to positive environmental stimuli. Research has generally supported the supposition that NA and PA are two higher-order variables that account for the large degree of shared variance among measures of psychological well-being and distress (e.g., Watson & Clark, 1984; Watson & Tellegen, 1985; Fortunato & Stone-Romero, 1999). In addition, research has

Table 2
Regression analyses showing variance explained by Future, Past, and Present thinking on resiliency, optimism, cynicism, anxiety, and depression ($N = 580$).

Variable	Resiliency			Optimism			Cynicism			Anxiety			Depression		
	ΔR^2	B	β	ΔR^2	B	β	ΔR^2	B	β	ΔR^2	B	β	ΔR^2	B	β
Thinking Perspective	.34***			.23***			.08**			.08***			.16***		
Future thinking		.40***	.39		.24***	.18		−.04	−.04		−.05	−.6		−.12*	−.11
Past thinking		−.15***	−.19		−.39***	−.37		.28***	.26		.20***	.26		.31***	.34
Present thinking		.31***	.33		.30***	.25		−.16	−.13		−.10***	−.11		−.21***	−.19
Constant		2.75			3.78			3.48			1.85			2.27	

Note: Regression analyses were conducted using list-wise deletion of scores.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

also shown that NA and PA have their physiological correlates. For example, research by Davidson (1992) and Tomarken and Keener (1998), as cited by Watson et al. (1999), indicates that the subjective experiences of NA and PA are consistent with different levels of activity in the right and left pre-frontal cortex, respectively: resting activity in the left pre-frontal lobe is associated with the tendency to experience subjective PA, whereas right pre-frontal lobe activity is associated with the tendency to experience subjective NA. Conversely, left pre-frontal lobe activity has been associated with heightened appetitive or incentive motivation and heightened responsivity to rewards and other stimuli, whereas resting activity in the right pre-frontal lobe is associated with withdrawal oriented behavior. In addition, research by Gray (1982, 1987) as cited by Watson et al. (1999) shows that positive versus negative emotionality, psychological happiness versus distress, and stress reactivity appear to involve different neurotransmitter systems.

However, we propose that a separate top/down cognitive/memory-based system associated with individuals' utilization of episodic and semantic memory also accounts for individual variation in the expression of well-being, baseline levels of stress, and psychological distress. For example, the executive functions associated with meta-mind (e.g., Suddendorf, 1999; Suddendorf & Corballis, 2007) appear to involve higher-order cortical functions involving Area 11 of the pre-frontal cortex and neural loops encompassing the basal ganglia. These higher-order functions have been shown to vary within Homo sapiens and across species (e.g., Suddendorf & Busby, 2003, 2005). In addition, research by Trope, Liberman, and associates (e.g., Förster et al., 2004; Liberman & Trope, 1998; Trope & Liberman, 2003, 2010) shows that temporal distance, defined as the perceived proximity of an event in time, changes people's responses to events by altering their mental representation of events, and that these alternations influence a variety of behavior ranging from optimism to creativity to the expression of social values. Thus, we propose that Future, Past, and Present thinking are the psychological correlates of a physiological-based higher-order cognitive/memory system associated with the executive functions that include mental time travel. Moreover, we propose that Future, Past, and Present thinking, in turn, contribute to the manifestation of individual differences in well-being and psychological distress. Future research is needed to examine this proposition.

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