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Frequency, Characteristics and Functions of Future-oriented Thoughts in Daily Life

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Summary: Despite the growing interest in future-oriented cognition in various areas of psychology, there is still little empirical data regarding the occurrence and nature of future-oriented thoughts in daily life. In this study, participants recorded future-oriented thoughts occurring in natural settings and rated their characteristics and functions. The results show that future-oriented thoughts occur frequently in daily life and can take different representational formats (more or less abstract), embrace various thematic contents (e.g. work, relationships) and serve a range of functions (e.g. action planning, decision making). The functions and characteristics of thoughts differed according to their temporal distance, with thoughts referring to the near future being more specific and serving action planning to a greater extent than thoughts concerning the far future. The characteristics of future thoughts were also related to affective content, with positive thoughts being more frequent, more specific, and associated with more visual images than negative thoughts. Copyright © 2009 John Wiley & Sons, Ltd.

In the past few years, future-oriented cognition has become an object of intense research in various areas of psychology and cognitive neuroscience (for reviews, see e.g. Atance & O'Neill, 2001; Schacter, Addis, & Buckner, 2008; Suddendorf & Corballis, 2007; Szpunar, in press). In spite of this growing interest, there is still little empirical data regarding the occurrence and nature of future-oriented thoughts in everyday life. Early work by Jason, Schade, Furo, Reichler, and Brickman (1989) showed that people estimate that they spend almost twice as much time thinking about the future as the past (38% *vs*. 21% of their time). Using a beeper to sample people's thoughts at random times during their everyday activities, Klinger and Cox (1987) observed that 12% of the sampled thoughts dealt with the future. More recently, Berntsen and Jacobsen (2008) found that representations of future events that are formed spontaneously in daily life (i.e. with no preceding conscious attempt at generating the representations) were as common as spontaneous memories, and both were generally triggered by identifiable cues in the current surroundings or train of thought.

These findings suggest that future-oriented thoughts occupy a prominent position in human mental life and share some properties with memories of past events. However, the characteristics and functions of future thinking in daily life remain to be investigated in detail. For example, the imagination of future events may serve various functions, including decision making (Bechara & Damasio, 2005), action planning (Gollwitzer, 1999) and emotion regulation (Taylor, Pham, Rivkin, & Armor, 1998). To our knowledge, however, the extent to which future-oriented thoughts are recruited to serve these functions in natural settings has not been empirically investigated. In addition, the specificity and representational format of future-oriented thoughts experienced in daily life remain relatively unexplored. Although many studies to date have mainly focused on episodic forms of future thinking (i.e. the mental simulation of specific future events; Addis, Wong, & Schacter, 2008; D'Argembeau & Van der Linden, 2006; Szpunar & McDermott, 2008), it is likely that many future-oriented thoughts consist of more abstract representations. As in the case of autobiographical knowledge regarding the past (Conway & Pleydell-Pearce, 2000), people may have conceptual knowledge regarding their personal future (e.g. knowledge of goals and expected lifetime periods) that can be accessed without necessarily generating mental representations of specific events. The first aim of this study was to investigate these issues by exploring the characteristics and functions of future-oriented thoughts experienced in everyday life.

The second aim of this study was to investigate if and how the properties of future-oriented thoughts experienced in natural settings vary as a function of their temporal distance and affective content. According to temporal construal theory (Trope & Liberman, 2003), temporally distant future events are represented more abstractly than temporally close events. For example, there is evidence that people represent distant future actions more in terms of high-level goal-related knowledge (i.e. the 'why' aspects of actions) and near future actions more in terms of concrete details (i.e. the 'how' aspects of actions; Liberman & Trope, 1998). When explicitly asked to imagine specific events that might happen to them in the near and far future, people report experiencing more sensory and contextual details for near future events, again suggesting that the far future is represented more abstractly (Addis et al., 2008; D'Argembeau & Van der Linden, 2004). Thus, there is consistent evidence that the level of concreteness/abstraction of future representations varies as a function of temporal distance. In this study, we investigated whether this relationship between specificity and temporal distance also occurs for future-oriented thoughts that are formed in natural settings.

With regard to affective content, there is considerable evidence that most people have a positive view of their personal future (for review, see Sedikides & Gregg, 2008;

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Taylor & Brown, 1988). People believe that they will be more happy in the future than they are in the present or were in the past (Robinson & Ryff, 1999) and predict that they are more likely than their peers to experience positive future events (e.g. having a good job, owning their own home) and less likely to experience negative future events (e.g. being fired from a job, divorce; Weinstein, 1980). Most individuals are faster to generate positive compared to negative future events (Newby-Clark & Ross, 2003) and representations of positive events are generally more detailed than representations of negative events (D'Argembeau & Van der Linden, 2004). There is also evidence that defects in the positive view of the personal future are associated with psychopathological states, such as depression and anxiety (e.g. MacLeod & Byrne, 1996). Optimism thus appears to be an important feature of future-oriented thinking, which is positively related to psychological well being (MacLeod & Conway, 2007) and even physical health (Taylor, Kemeny, Reed, Bower, & Gruenewald, 2000). In the current study, we explored whether everyday future-oriented thoughts also reflect this positive view of the personal future.

METHOD

Participants

Sixteen young adults (8 women, 8 men) volunteered to participate in this study. They were aged between 19 and 28 years ($M = 22.2$ years, $SD = 2.6$) and had completed between 12 and 18 years of education ($M = 14.6$, $SD = 1.7$). Fourteen participants were undergraduate students at the University of Liège (Belgium) and the remaining two participants had just entered full employment. None of them had any history of neurological or psychiatric disorder. They were all recruited by word of mouth.

Procedure and materials

The study was divided in two parts: one for recording the number of future-oriented thoughts experienced during a typical day, and one for assessing their content, characteristics and functions. Each participant first underwent an information session, the purpose of which was to explain the concept of future-oriented thinking and to provide instructions regarding the tasks. Detailed written instructions were given to explain the concept of 'future-oriented thought', which was then discussed orally with the participant to ensure that it was correctly understood. A future-oriented thought was described as any thought concerning the personal future, including thoughts that refer to events that might happen at specific time points in the future (e.g. a dinner with friends next Saturday) or more general thoughts about the future that do not refer to specific events (e.g. thinking about possible professional orientations in abstract terms); thoughts people have in order to help them make a decision (e.g. considering possible outcomes of an action) or plan an action (e.g. thinking of what one has to buy at the grocery shop in order to prepare dinner), or thoughts or daydreams concerning the future that have no immediately apparent purpose; they could be intentional thoughts or thoughts that come spontaneously to mind; they could be positive thoughts or negative thoughts or thoughts without any marked affective content; they could concern personally important issues (e.g. thinking about a job interview) or trivial things (e.g. thinking about an errand one has to run); they could refer to the near future (e.g. later the same day or during the next few days or weeks) or to the more distant future (e.g. in several months or years). Thus, it was emphasized that we are interested in any thoughts concerning the future, whatever their content, personal importance, level of abstraction, emotional value and temporal distance. Once the experimenter was sure that the participant had correctly understood the concept of future-oriented thought, the instructions for the first part of the study were provided.

In the first part of the study, participants were asked to record all future-oriented thoughts they experience during a day, that is, from the moment they wake up to the moment they fall asleep. They were asked to carry a small notebook and a pen with them during the whole day and were instructed to draw a line each time they thought about the future. They were asked to draw the line immediately after the thought came to their mind or, if not possible (e.g. because they were driving), to record it as soon as they can. Participants were free to select any day they wanted to record their thoughts provided that it was a typical day of their life (e.g. not a holiday). After they had recorded their thoughts during a whole day, participants came back to the laboratory to report the number of thoughts they had experienced. They were then asked to rate on a 7-point scale the extent to which they omitted to record certain thoughts because they did not have the time or desire to record them (1 = not at all, 3 = a little, 5 = a lot, 7 = all the time) and the extent to which they felt they experienced more future thoughts than usual because they had to record them (1 = not at all, 3 = a little, 5 = a lot, 7 = tremendously).

Participants were then given instructions for the second part of the study. They were asked to describe the content of some future-oriented thoughts they experience during their daily activities and to rate the characteristics and function of each thought. They were asked to record a total of 10 thoughts in maximum 5 days. It was stressed that they were free to record any thought they wanted (whatever its content, characteristics, function, temporal distance and affective content). A notebook was provided to record the 10 thoughts. For each thought, participants were first asked to describe its content in a few lines (with enough details to enable the reader to understand what the thought was about). They were free, however, not to describe their thought if they considered it too intimate. In that case, they were instructed to write 'private'. This was done in order to prevent that participants avoid reporting a particular thought because it was perceived as embarrassing. Participants then rated the phenomenological characteristics of their thought (i.e. visual images, inner speech, affective content, personal importance, and the extent to which it came spontaneously to mind) using a series of 7-point rating scales (see Appendix). They were also asked to report the future time period which the thought referred to and, finally, to report what the main purpose of the thought was, by choosing between different categories (see

Appendix). The experimenter went through all the items of the questionnaire with each participant to ensure that everything was correctly understood. Participants were asked to describe and rate each thought immediately after the thought came to their mind.

Coding of content

The content of each future thought was coded by the first author according to its specificity and thematic content. A thought was coded as specific if it referred to a unique event that was precisely located in time and did not last more than a day (e.g. dinner with friends next Saturday; cf. Williams, Ellis, Tyers, Healy, Rose, & MacLeod, 1996) and it was coded as non-specific if it consisted of events taking place over an extended time period (e.g. thinking about going abroad next summer) or abstract thoughts that do not refer to particular events (e.g. thinking of possible professional orientations). The thematic content of each thought was categorized in 'work' (i.e. thoughts or episodes related to school or work), 'leisure' (i.e. thoughts or episodes related to hobbies, parties, sports, vacation, etc.), 'relationship' (i.e. thoughts or episodes that centre on one's relationship with friends, parents, children, boyfriend/girlfriend, etc.) and 'errand' (i.e. planning to buy something, to take an appointment, etc.). A random selection of 25% of the thoughts was scored by a second independent rater who was blind to the purpose of the study; there was good agreement between the two raters, both for specificity ($\kappa = 0.80$) and thematic content ($\kappa = 0.87$).

Data analyses

To investigate differences in the content, characteristics and function of future-oriented thoughts as a function of affective valence, we categorized each thought as positive, negative or neutral based on participants' ratings for affective content (negative thoughts had a score < 0; neutral thoughts had a score $= 0$; positive thoughts had a score > 0). In a similar vein, we categorized each thought as referring to the near future (i.e. the categories 'later the same day', 'next week' and 'between a week and a month' were collapsed together) or the far future (i.e. the categories 'between a month and a year', 'between 1 and 5 years', 'between 5 and 10 years', 'more than 10 years' were collapsed together) to investigate differences in thoughts' properties as a function of temporal distance[1].

Due to the hierarchical structure of the data (i.e. the sampled thoughts are nested within each participant and thus are not statistically independent), classical data analysis methods like ANOVA and χ^2 of independence tests are not the most appropriate (Wright, 1998). The models that are most appropriate for analysing this type of data are multilevel models. A general introduction is given in Goldstein (2003). Depending on the type of IV(s), these methods are generalization of the multiple linear regression and ANOVA models. In the case of a 7-point scale as DV (e.g. inner speech) and a categorical variable as IV (e.g. temporal distance: near *vs.* far future)[2], we analysed data with a two-stage multilevel model. A model with a random intercept is first estimated. It is exemplified in Figure 1(a). An overall effect (called fixed effect) is estimated by an intercept and a slope, like in a simple linear regression. If the slope is significantly different from zero, it indicates that the IV (e.g. temporal distance) has a significant effect on the DV (e.g. inner speech). In addition, a separate intercept (height of the line) can be estimated for each subject. An inter-subject variance or variability can therefore be estimated (see Figure 1(a)). An inter-subject variance close to zero would indicate that the subjects are all very close to the overall effect, whereas a large inter-subject variance would indicate that some subjects tend to rate very high and some subjects tend to rate very low. The complete results are provided in Table 1. The significance tests are also reported in the Results section. They represent the effect of the IV, i.e. the slope of the overall effect. It is assessed with the χ^2-distribution of the likelihood ratio test.

The random intercept models fitted well the data and correspond to the testing of the research hypotheses. However, multilevel models are extremely flexible and allow for different models to explore more deeply the structure of the data. In particular, an alternative model called random slope might be of interest. It is depicted on Figure 1(b). The overall effect is the same regression line, but the model is allowed to fit a separate slope for each subject, the intercept (in the middle of the graph) being the same for all subjects. The inter-subject variance or variability here is in the form of an interaction. In only one case (importance and temporal distance), a random slope model was better (but note that the significance of the IV (overall effect) is very similar between the two models), suggesting that the main difference between the subjects in this case is more in a star pattern (Figure 1b) than in a parallel lines pattern (Figure 1a). The result is provided on Table 1.[3] As already mentioned, because of the hierarchical structure of the data, an ANOVA

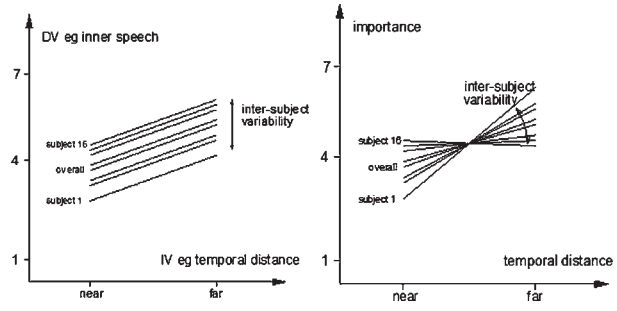

Figure 1. Schematic representation of (a) a random intercept model and (b) a random slope model

[1]Data were collapsed into two categories to have a sufficient number of thoughts per category. The cutoff point for defining the near future is arguably arbitrary. In this study, we defined the near future as extending to 1 month in order to be consistent with previous work (D'Argembeau, Xue, Lu, Van der Linden, & Bechara, 2008).

[2]Note that in the current study, IVs were formed *post hoc* rather than manipulated and thus the number of trials may vary across cells.

[3]The estimations are based on the ML (IGLS) criterion. For all analyses, the models fitted well the data and inspection of the residuals was satisfactory despite the discreteness of the DV. More complex models did not fit the data better.

Table 1. Results of multilevel analyses

IV	DV	σ^2, random intercept	Residual variance	Slope	χ^2 (LRT)	d.f.	*p*-value
Function	Visual images	0.81	2.89		7.11	3	.07
Function	Inner speech	0.28	3.65		20.01	3	<.001
Temporal distance	Visual images	0.94	2.96	0.009	0.01	1	.97
Temporal distance	Inner speech	0.35	4.14	0.68	3.08	1	.08
Temporal distance	Spontaneous	0.11	3.27	0.57	2.83	1	.09
Valence	Visual images	0.68	2.75		14.99	2	<.001
Valence	Inner speech	0.22	3.87		16.44	2	<.001
Valence	Importance	0.07	2.15		20.12	2	<.001
Valence	Spontaneous	0.14	3.25		2.26	2	.32

IV	DV	σ^2, random slope	Residual variance	Slope	t	d.f.	*p*-value
Temporal distance	Importance	0.89	1.40	−0.71	−2.44	143	.02

Note: σ^2 stands for inter-subject variance.

or a regression would not be valid to test the effects. As a check, we nonetheless ran one-way ANOVAs on all thoughts and the results are similar to the results of the multilevel analysis, except a mild difference for inner speech and temporal distance: $F(1, 158) = 4.07$, $p = 0.045$ for the ANOVA *versus* $\chi^2(1) = 3.08$, $p = 0.079$.

For testing the association between two categorical variables (e.g. temporal distance and specificity), the data again possess the same multilevel structure, which should be taken into account. Using a χ^2-test of independence would be as considering the 160 thoughts originating from 160 different subjects. We did not find any available test in the literature in presence of a multilevel structure. We propose to use a permutation test (Good, 1994) that can be viewed as a multilevel generalization of the Fisher exact test. As in regular permutation tests and in Fisher exact test, we allow the permutation of the thoughts' labels. However, to keep the structure of the data, we restrict these permutations only within the subjects. The statistic used is the χ^2-statistic of independence but the *p*-value is obtained through 10 000 permutations. Although invalid, we also ran χ^2 of independence tests as a check and the results are similar to the results of the permutation test. All analyses were run on S-Plus 8.0 (Insightful Corporation, 2007).

RESULTS

Numbers of future-oriented thoughts experienced during a day

During the first part of the study, participants reported having experienced between 27 and 102 future-oriented thoughts ($M = 59$, $SD = 21$). The number of reported thoughts was not influenced by gender ($M = 61$ for women and 57 for men; $t < 1$) and was not related to age ($r = -.01$, $p = .99$) or years of education ($r = .11$, $p = .69$). Participants did not feel they omitted to record some thoughts because they did not have the time or because they simply did not want to record them ($M = 1.75$, $SD = 0.85$). On average, participants felt that they experienced a little more thoughts than usual because they were asked to record them ($M = 3.13$, $SD = 1.46$), suggesting that the reported frequency of future-oriented thoughts may be slightly (but not extremely) overestimated.

Specificity, thematic content and functions of future-oriented thoughts

Of the 160 thoughts collected in the second part of the study, 68 (42.5%) referred to specific future episodes, whereas 88 (55%) were non-specific (2.5% were described as 'private' and thus could not be classified according to specificity). With regard to their thematic content, 48 thoughts (30%) referred to leisure activities, 47 (29%) to work, 31 (19%) to errands and 25 (16%) to relationships; 9 thoughts (6%) could not be classified within these categories, either because they were described as 'private' or because their content did not relate to any category. With regard to their perceived function, 84 thoughts were related to the planning of an action (52.5%), 28 (17.5%) were related to making a decision or setting oneself a goal, 18 (11.25%) were categorized as thoughts or daydreams with no apparent purpose, 16 (10%) were thoughts to reassure oneself or feel better, and 14 (8.75%) could not be classified within these categories.

We also investigated whether the representational format of thoughts (i.e. visual images, inner speech) differed according to their function (see Table 1 for results of multilevel analyses). There was a significant effect for inner speech, revealing that action planning ($M = 4.58$, $SD = 2.10$) and decision making ($M = 4.75$, $SD = 1.97$) were associated with inner speech to a greater extent than daydreams ($M = 2.78$, $SD = 1.90$) and reassurances ($M = 2.81$, $SD = 1.68$). Visual images tended to show the reverse effect, that is, higher ratings for daydreams ($M = 4.11$, $SD = 2.17$) and reassurances ($M = 4.25$, $SD = 1.91$) than for action planning ($M = 3.17$, $SD = 1.86$) and decision making ($M = 3.46$, $SD = 2.10$), but the difference failed to reach statistical significance ($p = .07$).

Characteristics of future-oriented thoughts as a function of temporal distance

As illustrated in Figure 2, the number of reported thoughts decreased with increase in temporal distance, with 31% of

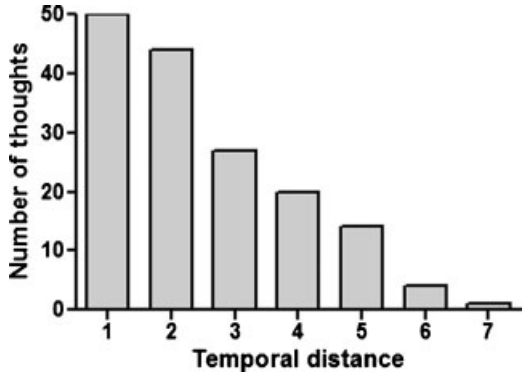

Figure 2. Number of future-oriented thoughts as a function of temporal distance (1 = later the same day, 2 = within the next week, 3 = between a week and a month, 4 = between a month and a year, 5 = between 1 and 5 years, 6 = between 5 and 10 years, 7 = more than 10 years)

thoughts referring to something occurring later the same day, 27.5% referring to the next week, 17% to the period between a week and a month, 12.5% to the period between a month and a year, 9% to the period between a year and 5 years, 2.5% to the period between 5 and 10 years and 0.5% to more than 10 years.

To investigate differences in thoughts' characteristics as a function of temporal distance, we categorized each thought as referring to either the near future or the far future (see Method for details). The data are shown in Table 2. There was a significant association between temporal distance and specificity (permutation test, $p < .001$), with participants reporting more specific thoughts for the near future than for the far future. There was also a significant association between temporal distance and thematic content ($p < .001$): Thoughts referring to relationships were more frequent for the far future and thoughts referring to leisure and errands were more frequent for the near future; the proportion of thoughts referring to work was roughly equivalent between the near and far future. Temporal distance was also significantly associated with function ($p < .001$): Most of the thoughts concerning the near future served to plan an action, whereas thoughts concerning the far future were more evenly distributed across different functions. Finally, thoughts referring to the near future received lower ratings for personal importance. As mentioned in the Method section, a random slope model fitted better the data in this case (see Table 1). As depicted on Figure 1(b), this means that for some subjects ratings of personal importance were very different between the near and far future (i.e. much more that the average 1-point difference mentioned above), whereas the difference between near future and far future was small for other subjects. There was no significant difference between the near and far future for visual images, inner speech and the spontaneous/voluntary dimension (see Table 1 for results of multilevel analyses).

Characteristics of future-oriented thoughts as a function of affective content

With regard to affective content, 41.25% of the thoughts were positive (rating > 0), 37.5% were neutral (rating = 0) and 21.25% were negative (rating < 0). The characteristics of positive, neutral and negative thoughts are shown in Table 3. As can be seen, positive thoughts referred to specific events more frequently than negative thoughts ($p = .03$). Thematic content also differed across affective categories ($p < .001$): Most positive thoughts were related to leisure activities or relationships, whereas most negative and neutral thoughts were related to work. There was also a significant association between affective content and function ($p < .001$): Although action planning was the most frequent function for the three categories of thoughts, positive and negative thoughts served an emotion regulation function more than neutral thoughts. With regard to phenomenological characteristics, ratings for visual images differed significantly across the three types of thoughts (see Table 1 for results of multilevel analyses) and follow-up comparisons showed that positive thoughts contained more visual images than both negative and neutral thoughts ($ps < .01$); negative and neutral thoughts did not

Table 2. Characteristics of future-oriented thoughts as a function of temporal distance

	Near future	Far future
Specific thoughts (%)	54	11
Thematic content (%)		
Work	31	32
Leisure	35	24
Relationship	9	37
Errand	25	7
Function (%)		
Decision making	14	28
Action planning	63	21
Reassurance	7	21
Daydreams	7	23
None	9	7
Phenomenological characteristics (mean ratings)		
Visual images	3.42 (2.01)	3.69 (1.92)
Inner speech	4.33 (2.17)	3.53 (1.99)
Personal importance	4.26 (1.57)	5.26 (1.46)
Spontaneous	3.81 (1.89)	3.23 (1.69)

Note: Standard deviations are shown in parentheses.

Table 3. Characteristics of future-oriented thoughts as a function of affective valence

	Positive	Neutral	Negative
Specific thoughts (%)	49	47	27
Thematic content (%)			
Work	10	42	55
Leisure	46	27	12
Relationship	28	4	15
Errand	16	27	18
Function (%)			
Decision making	11	20	26
Action planning	48	65	38
Reassurance	14	3	15
Daydreams	23	3	3
None	4	9	18
Phenomenological characteristics (mean ratings)			
Visual images	4.32 (1.87)	2.80 (1.99)	3.09 (1.58)
Inner speech	3.30 (2.08)	4.88 (2.03)	4.44 (1.97)
Personal importance	5.00 (1.47)	3.77 (1.62)	4.85 (1.35)
Spontaneous	3.59 (1.85)	3.92 (1.88)	3.38 (1.84)

Note: Standard deviations are shown in parentheses.

differ between each other ($p = .96$). Ratings for inner speech also differed across the three types of thoughts, with positive thoughts containing less inner speech than both neutral ($p < .01$) and negative thoughts ($p = .02$); neutral and negative thoughts did not differ between each other ($p = .69$). Personal importance was also related to affective content, with positive ($p < .001$) and negative ($p = .002$) thoughts being rated as more important than neutral thoughts; positive and negative thoughts did not differ between each other ($p = .90$). Finally, the spontaneous *versus* voluntary character of the thoughts did not differ across the three types of thoughts.

DISCUSSION

This study shows that future-oriented thinking occurs frequently in everyday life, which confirms earlier investigations (Berntsen & Jacobsen, 2008; Jason et al., 1989; Klinger & Cox, 1987). On average, the participants experienced 59 future-oriented thoughts during a typical day, which roughly corresponds to experiencing one future-oriented thought every 16 minutes (considering 16 hours of awake time). The findings further indicate that future-oriented thoughts can take different representational formats (more or less abstract), embrace various thematic contents (i.e. work, relationships, leisure activities and errands) and serve a range of functions (i.e. action planning, decision making and emotion regulation). Thus, future-oriented thinking appears to be an important and pervasive mental activity.

Although many studies to date have focused on episodic forms of future thinking (e.g. Addis et al., 2008; D'Argembeau & Van der Linden, 2006; Szpunar & McDermott, 2008), the current data show that a substantial amount of future-oriented thoughts experienced in daily life (more than half of reported thoughts) consists of abstract representations that do not refer to specific events. This finding indicates that people frequently access conceptual knowledge regarding their personal future (e.g. abstract representations of long-term goals and anticipated lifetime periods), without generating mental representations of specific episodes.

This study also shows that the frequency, characteristics and functions of future-oriented thoughts experienced in natural settings differ as a function of temporal distance. First, our finding that the frequency of future-oriented thoughts decreased with increase in temporal distance is consistent with research that has investigated the temporal distribution of future events generated in response to cue words (Spreng & Levine, 2006). Second, near-future thoughts referred to specific events more often than far-future thoughts, which is in keeping with the idea that concrete details are used more often when representing the near future (Trope & Liberman, 2003). Interestingly, the functions of future-oriented thoughts also differed according to temporal distance, with the vast majority of near-future thoughts dealing with action planning, whereas far-future thoughts were more evenly distributed across various functions (i.e. decision making, emotion regulation and action planning). These findings suggest that the primary purpose of thinking about the near future may be to implement mental simulations of action plans leading to goal attainment (Gollwitzer, 1999), that is, the 'how' details of actions (Liberman & Trope, 1998). The current data further indicate that action planning and decision making are associated with higher levels of inner speech compared to other functions. There is evidence that inner speech plays a key role in planning and self-regulation (Morin & Michaud, 2007; Neck & Manz, 1992). The occurrence of inner speech may thus reflect the use verbal self-guidance to plan future actions (e.g. 'I should leave earlier from work and do the groceries on my way home') and motivate oneself to perform these actions (e.g. 'if I don't leave earlier, I won't be able to prepare dinner before the guests arrive').

The results also showed that far-future thoughts were rated as being more personally important than near-future thoughts (see also Addis et al., 2008; D'Argembeau & Van der Linden, 2004). In addition, analyses of thematic content revealed that representations of the far future were more related to relationships, whereas representations of the near future were more related to errands. Again, these findings are in keeping with the view that representations of the far future refer more to high-level goal-related knowledge (e.g. getting married), whereas representations of the near future refer more to low-level details of actions (e.g. what to buy for dinner). Overall, then, the present findings show that the specificity, content and functions of future-oriented thoughts experienced in natural settings vary as a function of temporal distance, therefore providing additional support for temporal construal theory (Trope & Liberman, 2003).

With regard to affective content, we found that participants reported more positive thoughts than negative thoughts, and that positive thoughts referred to specific events more often than negative thoughts. These findings are consistent with studies that investigated the influence of affective valence on future thinking in the laboratory (e.g. MacLeod & Byrne, 1996; Newby-Clark & Ross, 2003). Furthermore, positive thoughts contained more visual images than negative thoughts, which is also consistent with earlier investigations (e.g. D'Argembeau & Van der Linden, 2004). According to Conway, Meares, and Standart (2004), visual images play a key role in representing information about goals (e.g. goal standards such as future states to approach or avoid). Visualizing desired future events may aid in goal attainment, by increasing expectation of success, by enhancing motivation and by prompting concrete plans and problem-solving activities (Taylor et al., 1998). It should be noted, however, that not every positive future thought is likely to have benefits in terms of goal pursuit. Positive images that focus exclusively on the positive outcome itself may lead people to erroneously expect smooth and effortless goal attainment and may therefore decrease the likelihood of action. For example, Pham and Taylor (1999) found that students who mentally simulated the process required to achieve a goal (studying for an exam) spent most time preparing for a midterm and achieved the best grades, whereas participants who exclusively imagined the desired outcome (receiving a good grade) prepared the least for the exam and performed worst (see also Gollwitzer, 1999; Oettingen & Mayer, 2002). Nevertheless, in this study, positive future-oriented thoughts consisted of action planning more often than daydreams with no purpose (48% *vs*.

23%), suggesting that the majority of positive future-oriented thoughts may benefit goal pursuit. As already mentioned, optimism also provides some advantages in terms of mental and physical health (MacLeod & Conway, 2007; Taylor & Brown, 1988; Taylor et al., 2000) and it is likely that the frequent occurrence of positive future-oriented thoughts in daily life contribute to these effects.

To conclude, the current findings indicate that future-oriented thinking is a pervasive mental activity that can take different representational formats (more or less abstract) and embrace various thematic contents. To our knowledge, this study is also the first to provide evidence that future-oriented thoughts are frequently used in everyday life to plan actions, make decisions and regulate emotions. Future-oriented thinking thus appears to be an important mental activity that has a clear adaptive value. We also found that the specificity, function and content of future-oriented thoughts differed as a function of temporal distance, providing further evidence for temporal construal theory. Finally, the characteristics of future thoughts were also related to affective content, with positive thoughts being more frequent, more specific, and associated with more visual images than negative thoughts. Displaying such a positive view of the personal future might benefit goal pursuit and might provide some advantages in terms of mental and physical health.

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APPENDIX

Questionnaire used to rate each future-oriented thought

(1) This thought is in the form of visual images (e.g. images of people, objects and so forth)

1	2	3	4	5	6	7
not at all						completely

(2) This thought is in the form of inner speech (i.e. as if I was talking to myself)

1	2	3	4	5	6	7
not at all						completely

(3) The affective content of this thought is

−3	−2	−1	0	1	2	3
very negative			neutral			very positive

(4) The content of this thought is important to me (it deals with something important in my life)

1	2	3	4	5	6	7
not at all						very important

(5) To what degree did your thought come spontaneously to mind?

1	2	3	4	5	6	7
completely spontaneously						completely voluntarily

(6) What future period does your thought refer to? (choose the category that best corresponds to your thought)

- ☐ later the same day
- ☐ within the next week
- ☐ between a week and a month
- ☐ between a month and a year
- ☐ between 1 and 5 years
- ☐ between 5 and 10 years
- ☐ more than 10 years

(7) What is the main purpose of your thought? (choose the category that best corresponds to your thought)

- ☐ to make a decision/to set myself a goal
- ☐ to plan an action
- ☐ to reassure myself or feel better
- ☐ a daydream with no obvious purpose
- ☐ other (specify)