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Dream emotionality. Selected formal properties of dreams¹

Abstract: The aim of the study was to verify hypotheses about time changeability of dream characteristics depending on the participants' age and affective value of the dream. The study was conducted online. Participants of the study were 68 individuals between the age of 17 and 85. The participants were asked to prepare detailed descriptions of their dreams, next they had to identify elements of the dreams, refer them to their real life, and assess their affective value. In the dreams of late adolescents, and young and middle-aged adults the most frequently recalled period in a positive context turned out to be late adolescence and early adulthood, whereas in a negative context the participants would recall their present developmental phase and the period of late childhood. Unpleasant dreams of older individuals were mainly connected with the period of middle adulthood, whereas those pleasant ones referred to various periods of their entire life.

Key words: dreams, affect, autobiographical memory, life span

Systematic studies on the distribution of autobiographical memories across the lifespan have been conducted for many years now. Some of them, apart from time references, take into account also the emotional value of memories. The aim of the studies presented in this paper was to check whether in dreams one can observe temporal and affective characteristics typical of autobiographical memories when awake.

During sleep, a very personal state, a human being is not conscious, however his or her consciousness and self-consciousness are preserved, at least to a certain extent (Brown, 2003). Contents of dreams, triggering feelings and memories as strong as those experienced when awake (Horton, Conway, & Cohen, 2008), become a part of autobiographical memory, from which, in turn, we derive memories of real events, incorporating them into the contents of dreams (Horton, Moulin, & Conway, 2009). Already at the beginning of the 20th century, Freud (1900/2007) noticed that in dreams there appear memories of events that took place the day before, and he coined for this effect the term “*day residue*”. Many contemporary studies not only confirm Freud's finding (e.g., Nielsen & Powell, 1992; Nielsen, Kuiken, Alain, Stenstrom, & Powell, 2004), but also point to wider relationships between dreaming and the state of being awake within autobiographical memory (e.g., Cappeliez, 2008; Fosse, Fosse, Hobson, & Stickgold, 2003).

Autobiographical memories

In a model of autobiographical memory proposed by Conway and Pleydell-Pearce (2000), known as the *Self Memory System* (SMS), the authors distinguished an autobiographical knowledge base and processes of constructing memories. Autobiographical memories are understood here as temporary mind constructs, activated by control processes (the Working Self), that are created on the basis of information collected during a person's lifetime. They constitute a specific class of mind models that are distinguished by possessing episodic memories and the knowledge of the Self, and they are a result of processing personal goals (Conway, Singer, & Tagini, 2004).

Episodic memories are global records of sensory-perceptive-cognitive-affective experiences, originating from working memory, and forming a separate system. Memories connected with particular experiences often call to mind their images or are experienced afresh in the moment of their recollection. The system of episodic memory is responsible for maintaining adaptive correspondence, i.e., changeability of thinking and motivation, which occurs during task realization. In the human cognitive system there occurs a certain conflict between maintaining adaptive correspondence and coherence that results from the cohesion of the knowledge of oneself. For the process

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of maintaining coherence, responsible is the Long-term Self that consists of the autobiographical knowledge base and the knowledge of oneself (the Conceptual Self) (Conway et al., 2004).

Taking into consideration the conflicting requirements described above, the Working Self, responsible for creating a dynamic psychological model of the present and for the realization of personal goals, connects episodic memories with the autobiographical knowledge in the process of forming autobiographical memories (Conway & Pleydell-Pearce, 2000; Conway et al., 2004). The Working Self controls the process of recording and making available data from the long-term memory via working memory. Every change in the structure of goals is connected with considerable cognitive and affective costs, and at the time when changes are introduced, the Self is more vulnerable and liable to destabilization. Also, its ability to function efficiently in the world decreases. For that reason, control processes, playing a protective role, can decrease the availability of memories about certain events, if these memories expose the structure of goals to change (Conway, 2005).

Temporal characteristic of autobiographical memories

Rubin, Wetzel, and Nebes (1986) have developed a model of the distribution of autobiographical memories over a person's lifetime. The model consists of three elements. The first of these elements – the recency effect – is connected with the phenomenon of decreasing the availability of memories about events with time. The availability of memories decreases in a monotonic way, which in practice means that more than a half of our memories pertain to the last year (Berscheid, 1994). According to Conway and Pleydell-Pearce (2000), the high availability of memories from the recent past is connected with their relationship with present goals of the person.

Berntsen and Rubin (2002) link the high frequency of appearance of events from the last year in autobiographical memories to a high emotional value of these memories. Studies of other authors (Walker, Rodney, & Thompson, 1997) have shown that in the case of negative memories the affective value decreases with time more rapidly than in the case of positive memories, which is why one can expect a smaller number of unpleasant memories among memories from the recent past.

The second element of the model proposed by Rubin et al. (1986) is reminiscence. This effect occurs in individuals over the age of 35, and it manifests itself in a higher, than it could be expected on the basis of forgetting curve, number of memories originating from the period when the individuals were between the age of 10 and 30 (Rubin, Rahhal, & Poon, 1998). Conway and Pleydell-Pearce (2000) link the increased availability of memories from this period to their permanent connection with the Self. Probably, a great number of memories from the period of adolescence and early adulthood are associated with experiences that define the Self and set it in a concrete reality (Rathbone, Moulin, & Conway, 2008). Memories that define the Self are: linked to other memories, distinct,

emotive, re-occurring regularly, and pertain to constant motives or unsolved conflicts. The effect of reminiscence is associated with a critical time for the formation and maintaining of a stable Self (Rubin et al., 1998).

Berntsen and Rubin (2002) have observed, however, that only memories of positive life events create the reminiscence bump, whereas the availability of negative memories decreases in line with the forgetting curve.

From the developmental perspective, the period of late adolescence and early adulthood is a time of achieving emotional maturity, entering into wide social relations, shaping psychological autonomy, and crystallizing the person's identity. At this age, in the process of development there dominate tendencies to undertake more and more directed, complex and purposeful activities, and there shape internal mechanisms of their regulation. Increasingly more significant role in organizing the person's activities start to play dreams, expectations and plans that pertain to the future, and actions that are undertaken by the individual serve as means of their realization (Tyszkowa, 1977). Goals that are formulated in this period and actions that are undertaken in order to achieve them are very pragmatic and they are realized with a large dose of determination and consequence. A number of studies have shown that among young Polish people there dominate goals connected with a happy family life (e.g., Mariański, 1993; Przeclawska & Rowicki, 1997).

The third element – childhood amnesia, which consists in an almost complete lack of recollection of events that took place in the first five years of life (Rubin et al., 1986), from the perspective of the SMS model is seen as a consequence of considerable changes in hierarchy of goals within the Working Self. Rathbone et al. (2008) explain that the specific distribution of memories in this period is connected with transformations of relationships between the Self and autobiographical memory, which later stabilize in late adolescence and early adulthood.

Dreams

Few studies of memory processes and dreaming have confirmed the appearance of episodic memories and elements connected with past experiences also in the contents of dreams (e.g., Fosse et al., 2003). Yet, the functioning of autobiographical memory during sleep probably differs from its functioning during constructing memories when awake (Horton et al., 2009). Nevertheless, there exist premises, originating from studies on temporal characteristics of dreams, that support the hypothesis about continuity of memory processes during sleep and when awake.

Temporal characteristic of dreams

Grenier and colleagues (2005) observed considerable similarity between the distributions of temporal references of elements that occur in dreams and the temporal distributions of autobiographical memories collected in the same sample. In the dreams of the two investigated groups – younger and older adults, comparably to autobiographical

memories recalled by the participants when awake, the recency effect and childhood amnesia could have been observed, and in the dreams of the older adults there also appeared the effect of reminiscence. In these studies, the authors did not take into consideration the affective value of neither dreams nor autobiographical memories.

A number of studies (e.g., Nielsen & Powell, 1992; Marquardt, Bonato, & Hoffmann, 1996; Blagrove et al., 2011) on temporal characteristics of dreams pointed to the existence in dreams a significant representation of recent events, especially from the previous day (the so-called *day-residue effect*) and events that occurred one week before (the so-called *dream-lag effect*). According to the SMS theoretical model, during dreaming information that pertain to personal goals become integrated into the structures of the autobiographical knowledge, which, when the person is awake, can be difficult to accomplish, due to the engagement of the SMS in conscious processes of monitoring the reality (Horton et al., 2009).

The results obtained by Cappeliez (2008) indicate that in dreams that include elements that refer to the period of reminiscence, the motive of identity and personal goals is distinctly visible. For that reason, these elements are important even in the dreams of older individuals, because in late adulthood, using the resources of autobiographical memory, they (re)construct a coherent and meaningful Self (Cappeliez, 2008). Interpreting the results with reference to the SMS theory, Cappeliez inclines towards the thesis of Conway and Pleydell-Pearce (2000) about the important role of goals of the Working Self in constructing autobiographical memory.

Issues connected with the realization of life goals and their reflection in contents of dreams have been examined by Horton et al. (2009), who showed that changes of contents of dreams reflect changes in the self-concept that take place during the period of identity transformation. The authors suggest that the self-concept, being a cognitive construct, exerts a considerable influence on autobiographical memory understood as the self-memory system, and the organizational function of the SMS is active during the cyclically succeeding one another periods of being awake and being asleep.

Life goals may also find their reflection in contents of dreams connected with events that are still to come. Erlacher, Ehrlenspiel, and Schredl (2011), examining German athletes, showed that 15% out of 840 representatives of different sport disciplines experienced during the last year at least one stressful dream about a competition that they were to participate in the following day. As many athletes experienced a similar dream over their entire sport career.

If control processes operate below the threshold of consciousness (Conway & Pleydell-Pearce, 2000), they should be responsible for the coordination of cognitive data, affective processes and behavior also during sleep. When compared to autobiographical memories recalled when awake, episodic memories and the autobiographical knowledge in dreams can be more fragmented and incoherent (Horton et al., 2009).

On the basis of the concepts mentioned above, the following hypotheses have been formulated:

- H 1: Depending on the age of the participants and the affective value of their dreams, significantly different periods of life will be represented in the contents of their dreams.
- H 2: According to the model of continuity, in dreams there should occur phenomena analogous to those that appear in autobiographical memory when awake, i.e., the recency effect, reminiscence, and childhood amnesia.
- H 3: The appearance of the reminiscence effect depends on the age of the investigated individuals – it is more likely to be observed in older individuals.
- H 4: The affective content of dreams can modify the appearance of the reminiscence effect (see Berntsen & Rubin, 2002) and the recency effect.

In studies on autobiographical memory, researchers very frequently apply the Galton-Crowitz method of directed associations (Janssen, Chessa, & Murre, 2005). Under this procedure, investigated individuals are usually asked to recall certain events in response to a word-clue. For the purpose of the studies reported in this article, a loose paraphrase of the Galton-Crowitz method was created.

Due to the intimate character of the collected data, i.e., the contents of the participants' dreams, the author decided to conduct the study online, in order to increase the participants' sense of privacy and anonymity. Eliminating the presence of an investigator served as means of excluding external social control that in the case of dreams has predominantly internal character. Designing the study, the author took into consideration guidelines for studies conducted with the use of the Internet (Michalak & Szabo, 1998).

Method

Participants

Participants of the study were 5th year students of the University of Social Sciences and Humanities in Sopot, and their families and friends. Additionally, information about the project was sent to students of six Polish universities of the third age. The online form of the investigation enabled all of the informed participants to take part in the study. In total, there were 68 participants (47 women and 21 men). One person filled out the questionnaire twice. The participants were divided into three age groups of the same size ($N = 23$): the youngest (age range = 17–32; $M = 26.49$; $SD = 3.73$), middle-aged (age range = 32–41; $M = 36.70$; $SD = 3.44$) and the oldest (age range = 41–85; $M = 59.66$; $SD = 13.04$). Mean age in the investigated sample was 40.32 years, and standard deviation was 15.33 years. The majority of the participants (78.3%) declared higher education.

Materials and Procedure

The study was conducted via the Internet in an online mode. For the purpose of the study, an online tool was created. The tool was published on the www.badaniemgr.pl website, and it was available from Sep 9, 2012 to Jan 13, 2013. The questionnaire was provided with an introduction

(that included an invitation to take part in the study, information about the anonymous character of the study, and a short description of the procedure and the potential way of preparing oneself for the study), a demographic section, in which the participants provided their basic personal data (date of birth, sex, education) and where they stated how often they dream (several times per week / once a week / several times per month / once per month), how well they remember their dreams (very good / good / poorly / very poorly), how many hours per day they sleep (a scale ranging from 1 to 12), and where they also assessed whether they considered themselves as spontaneous and excitable individuals (yes / no / I don't know).

In the proper part of the questionnaire the participants were asked to write down one of their dreams that they had during one of the recent nights, providing as many details as possible, such as: physical sensations, feelings, and any other elements that they were able to remember. From the written down content of the dream, each participant listed particular elements (objects, persons, thoughts, feelings, sensations; they could be expressed with the use of, for instance, nouns, verbs, or adjectives) that referred to their real life, and they stated with which period of life the particular element was connected. The participants would define the time of the particular elements with the use of one of two methods: they would write down how long ago an event connected with the particular element took place (e.g., 3 days ago, 8 months ago, 20 years ago), or they would provide an approximate age when it happened (e.g., I was 30). Thanks to that, in line with the concept of Klinger, in which elements of dreams create an associative network that does not necessarily have to consist of elements that are close to one another in time (1971, after Grenier et al., 2005), the applied method did not determine in advance the unity of time, typical of the state of being awake and autobiographical memories. The unity of the place of origin of elements, in the case when all of the recalled elements of the dream referred to one period of life, could still have been observed. The participants were provided with detailed instructions and an example how to fill out the questionnaire (examples have been presented in Appendix).

In order to check what was the period of life the participants referred to in their dreams, arithmetic mean of three (occurring as first) time references distinguished in the description of the dream was calculated. Internal consistency of using the first three temporal indicators was then assessed: Cronbach's alpha for the first three positions was 0.77.

At the end of the study, the participants were asked to evaluate the overall affective content of the dream with the use of a 5-point scale (very pleasant / pleasant / neutral / unpleasant / very unpleasant).

Results

Characteristic of the investigated sample

In the investigated sample, the mean age of women was slightly lower ($M = 37.68$ years; $SD = 13.64$) than that of men ($M = 46.25$ years; $SD = 17.48$), $t(66) = 2.19$; $p < 0.05$. Moreover, men declared better remembering of dreams ($M = 2.43$; $SD = 0.81$) than women ($M = 1.91$;

$SD = 0.72$), $t(66) = 2.62$; $p < 0.05$. The last result does not mean that men indeed remembered their dreams better, because without an access to the contents of the dreams this cannot be objectively stated. This result reflects rather the degree to which the participants confide in their memory.

Characteristic of the participants' dreams

Due to the fact that one person took part in the study twice, providing a description of two independent dreams, in further analyses, adopting a dream as a unit of analysis ($N = 69$), the author obtained the following results: the mean of the declared average number of hours of sleep per day was 7.32 ($SD = 1.23$), the smallest number of hours of sleep declared by the participants was 5 per day, whereas the highest – 12 hours per day. Correlational analysis showed that there was a weak negative relationship between the age and the average number of hours of sleep per day ($r = -0.25$; $p < 0.05$). The older the participants were, the less time they slept.

When it comes to affective value of dreams, the author obtained a two-modal distribution: out of the total number of dreams described by the participants, 44.9% of the dreams were evaluated as “very pleasant” and “pleasant”, 42% as “unpleasant” and “very unpleasant”, and only 13% were characterized by a neutral affective value.

Time references in dreams

On the basis of the created indicator of time localization of dreams, the author checked to which period of life the participants referred in their dreams and whether this period was different in the three distinguished age groups. The conducted variance analyses showed that the three groups differed significantly from one another in this respect – which means that the participants from different groups referred in their dreams to different life periods. The youngest individuals would go back, on average, to the age of 21.48, the older ones to the period when they were 29.22, and the oldest individuals to the age of 47.44, $F(2, 32.24) = 22.55$; $p < 0.001$.

Separate variance analyses were conducted for the dreams with a positive and negative affective value. In the case of the dreams recognized as positive, differences in the mean time references between all of the groups turned out to be statistically significant $F(2, 16.06) = 19.62$; $p < 0.001$. The results have been presented in Table 1.

When it comes to the dreams assessed as possessing a negative emotional value, statistically significant differences could have been observed in the case of the following pairs: between the youngest and the oldest group, and between the group of middle-aged individuals and the oldest group $F(2, 26) = 6.99$; $p < 0.005$. Detailed results have been presented in Table 2.

Due to the fact that in the case of the dreams with a negative content the participants referred to earlier periods of life than in the case of the dreams associated with a positive affect, the author conducted statistical analyses that were to check whether in the particular age groups the participants referred to different life periods depending on the affective sign of the dream. The following configuration of variables was applied in the variance analysis: 3 (age group)

Table 1. The comparison of the mean time references in the investigated groups for the dreams with a positive affective value

| Group | Time reference of the dream to the participants age | | Significance | |
|--------------|---|-----------|--------------|------------|
| | <i>M</i> | <i>SD</i> | Middle-aged | The oldest |
| The youngest | 21.41 | 4.17 | 0.038 | 0.001 |
| Middle-aged | 30.24 | 6.78 | | 0.010 |
| The oldest | 52.30 | 21.17 | | |

Table 2. The comparison of the mean time references in the investigated groups for the dreams with a negative affective value

| Group | Time reference of the dream to the participants age | | Significance | |
|--------------|---|-----------|--------------|------------|
| | <i>M</i> | <i>SD</i> | Middle-aged | The oldest |
| The youngest | 21.39 | 5.61 | 0.459 | 0.004 |
| Middle-aged | 27.49 | 11.27 | | 0.041 |
| The oldest | 41.89 | 16.38 | | |

x 2 (affective content of the dream) for dependent variables describing the time reference of the dream. The conducted analyses did not reveal main effect of the affective content of the dream, $F(1,54) = 0.614$; $p > 0.05$.

Due to the fact that the past of the older participants covers a considerably longer period of time, when compared to the younger participants, the author also decided to verify to what place on the lifespan scale the participants would go back in their dreams. To this end, the author introduced a variable that described the proportion of the time reference in the dream in relation to the participant's life length, and conducted variance analysis. On average, the youngest participants referred in their dreams to the period that constituted 82% of their life in relation to its entire length, the middle-aged to 80%, whereas the oldest individuals to 78%. Nevertheless, the variance analysis did not reveal any statistically significant differences between the groups: $F(2, 66) = 0.15$; $p > 0.05$. It seems, thus, that the psychological past of an individual is relativized in relation to the person's life length.

In order to verify the formulated hypotheses, a distribution of the time references for each group was created. In the conducted analyses, the author took into consideration all elements that were listed by the participants as features of their dreams, and then referred by them to a particular life period. These references were assigned on charts to respective 5-year-long time intervals. The distributions have been presented in Figure 1.

Separate distributions were prepared for the time references of elements of the dreams with positive and negative emotional value. These distributions have been illustrated in Figure 2 and 3, respectively.

The recency effect

In order to check whether, in line with the expectations, in the participants' dreams there occurred the recency effect, the author distinguished elements that according to the investigated individuals were connected with events from the year that preceded the emergence of the given dream. The conducted analyses showed a distinct recency effect: out of the whole pool of the elements distinguished by the participants in their dreams, 66.07% pertained to the last year, wherein 49.55% of these elements were associated with the last month, and 43.75% pertained to the last week. Detailed results have been presented in Table 3.

53% of the elements that the participants associated with the events from the last year originated from the dreams with a positive affect, whereas 38.51% came from the dreams of a negative emotional value. In the dreams of the youngest and the oldest group there were more positive elements than negative, whereas in the group of the middle-aged adults these proportions were reversed. Detailed results have been presented in Table 4.

In the distribution of the elements that referred to the events that took place one week before the dream, there appeared a characteristic of all age groups large number of references to the previous day, wherein the older the group, the difference between the number of references to "1 day before" and to "2 days before" was higher. In the youngest group, 7.59% of all distinguished elements pertained to the last day, whereas to the day before last only 2.45%. The individuals from the middle group referred to the last day before the dream 6.7% of the elements, whereas to the second day before the dream only 1.12%. In the group of the

Figure 1. The distribution of time references of all elements of the participants' dreams in the particular age groups

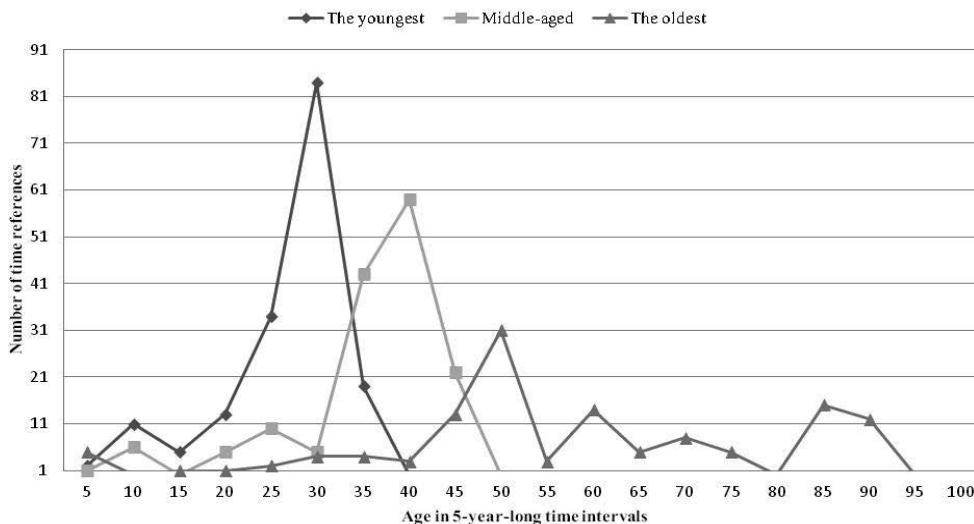


Figure 2. The distribution of time references of elements originating from the dreams with a positive affective value in the three age groups

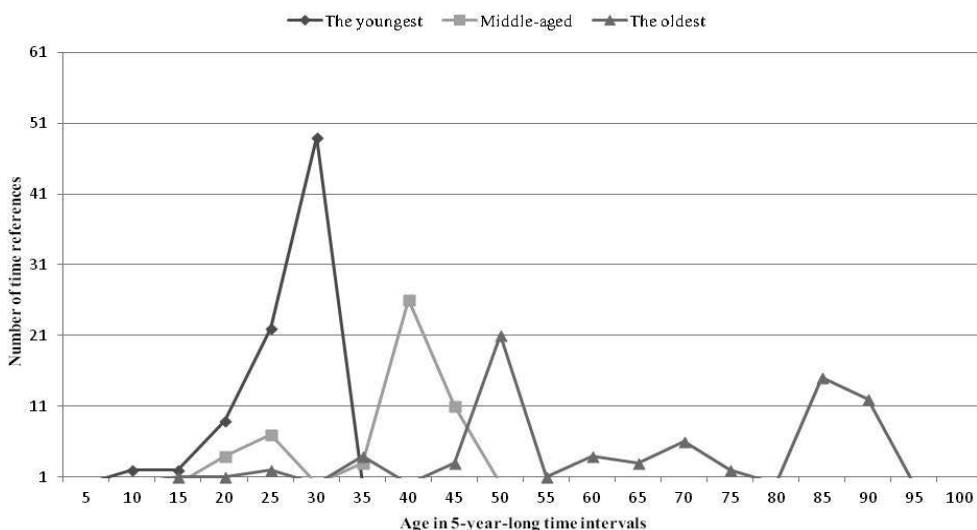


Figure 3. The distribution of time references of elements originating from the dreams with a negative affective value in the three age groups

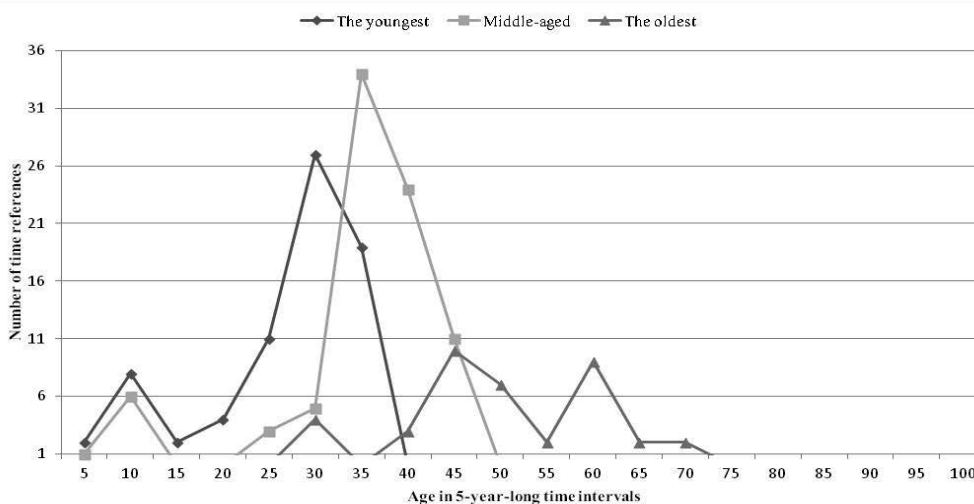


Table 3. The percentage distribution of elements that referred to a week, a month and a year before the occurrence of the dream with participation of the particular age groups in the total result

| Group | % of all elements | | |
|--------------|-------------------|-------|-------|
| | Week | Month | Year |
| The youngest | 16.20 | 18.97 | 24.78 |
| Middle-aged | 14.06 | 16.08 | 22.54 |
| The oldest | 13.39 | 14.51 | 18.75 |
| In total | 43.75 | 49.55 | 66.07 |

Table 4. The percentage distribution of positive and negative elements referring to the last year before the occurrence of the dream for the three age groups

| Group | % of the elements from the last year | |
|--------------|--------------------------------------|----------|
| | Positive | Negative |
| The youngest | 21.96 | 13.17 |
| Middle-aged | 12.16 | 18.24 |
| The oldest | 19.26 | 7.09 |
| In total | 53.38 | 38.51 |

oldest individuals, the discussed difference turned out to be the most significant – 10.04% of the elements were referred to the last day, and to the day before the last only 0.45%.

In all of the investigated groups similar differences have been observed in respect of the number of references to particular days of the week (there was a large number of events from 1–2 days earlier, and 6–7 days earlier). In none of the groups there occurred elements connected with the 5th day preceding the dream.

The reminiscence effect

In order to separate the reminiscence effect from the recency effect, elements associated with experiences from the last year before the dream were eliminated from further analyses. Separate distributions were created for the dreams with a positive and negative affective content. The distributions have been presented in Figure 4 and 5, respectively.

Figure 4. The distribution of time references of elements originating from the dreams with a positive affective value in the three age groups after excluding the recency effect

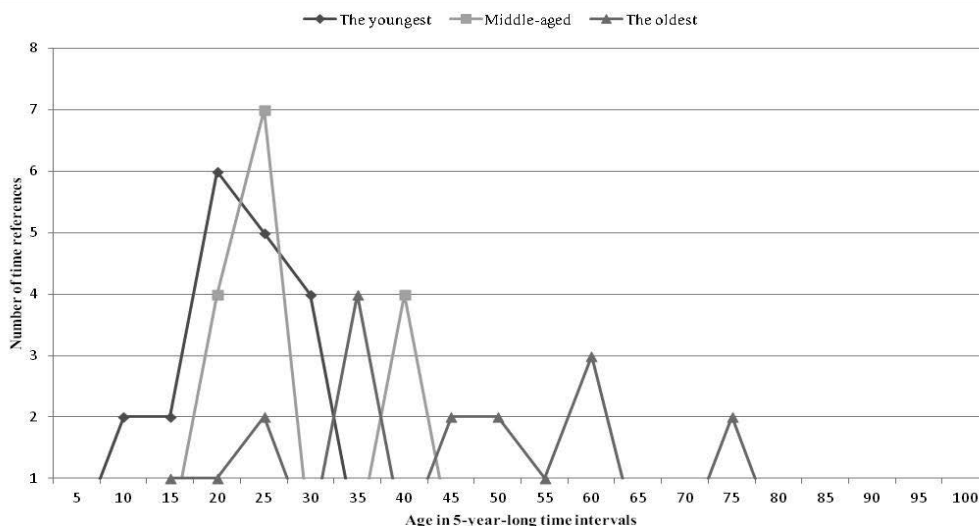
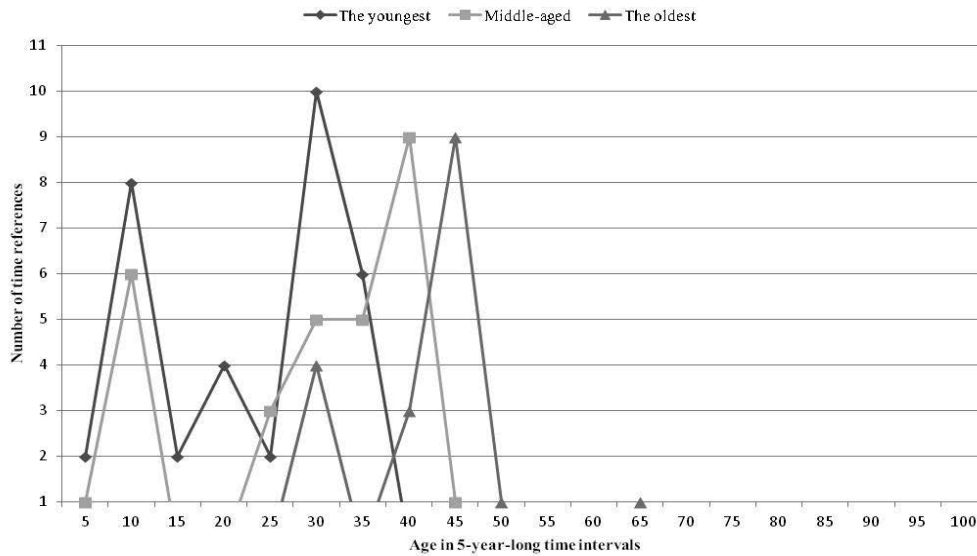


Figure 5. The distribution of time references of elements originating from the dreams with a negative affective value in the three age groups after excluding the recency effect



The highest number of unpleasant events represented in the contents of the dreams in all of the investigated groups was connected with a relatively recent past. In the group of the youngest individuals and middle-aged adults, a considerable number of negative memories incorporated in the contents of their dreams was also associated with the period of late childhood. Only in the group of the oldest individuals were there no references to this life period.

Childhood amnesia

In each of the investigated groups, the analysis of the time references of all elements of the dreams revealed only a small number of elements that referred to early childhood – the period before the age of 5 (see Figure 1 and 7).

In the case of the dreams associated with a positive affect, in none of the groups there appeared elements that originated from this life period. The earliest time references (of a small number of elements) pertained to the period between the age of 5–10 and 10–15 (see Figure 2 and 8).

In the dreams associated with a negative affect, there appeared only a small number of elements that referred to the period before the age of 5, while a quite large number of the elements turned out to be connected with the period of time between the age of 5 and 10 (see Figure 3).

The future

In the dreams of all groups, there appeared elements that pertained to the future. In the youngest group, out of all elements distinguished by the participants, 6.54% of the elements were connected with future events and they all came from the dreams with a positive emotional value. In the group of the middle-aged adults, 1.31% of the elements originated from the pleasant dreams and 1.96% from the neutral dreams (in total: 3.27%). In the oldest group, only 0.79% of the elements distinguished by the participants from this group pertained to future events, and these were pleasant dreams.

Unity of time. Out of all dreams reported in the research sample, only 14.49% were characterized by originating from the same period of life, 5.8% came from the dreams with a positive emotional value, the same percentage originated from the negative dreams, and 2.9% from the neutral dreams. In the case of 8.69% of the dreams of the youngest and the middle-aged individuals, all distinguished elements of the given dream pertained to the same day. In the dreams of the oldest participants, there were as many as 26.09% of such dreams in relation to all dreams reported by this group.

Discussion

The reminiscence effect

Comparison of the results obtained by the particular groups enables to observe that slightly different life periods found their reflection in the participants’ dreams, depending on the age and the affective value of the dream. The investigated adolescents and young adults dreamt most frequently about events connected with their present developmental period. This pertains to the dreams of both the positive and negative emotional value, wherein in the case of the latter category, reflections of the early school-age period could have been frequently observed.

When it comes to the middle-aged adults, the contents that referred to the participants’ current developmental phase were mainly reflected in the dreams with a negative affective value. In these dreams, comparably to the group of younger individuals, there also appeared a significant representation of the early school-age period. Pleasant dreams of the participants from this group were predominantly connected with the period of late adolescence and early adulthood.

The oldest participants dreamt in a positive affective context about so many different periods of their lives, that it is difficult to distinguish any regularity here. In turn, when it comes to the dreams of a negative emotional value, the

participants from this group dreamt mainly about the period of middle-adolescence. The oldest participants, as opposed to the adolescents, young adults and middle-aged adults, did not have unpleasant dreams about the period of late childhood.

A number of other studies have shown that the characteristic of dreams changes with age. Some of these transformations reflect changes in the cognitive and social development of a person (e.g., Karagianni et al., 2013; Strauch, 2005; Foulkes, 1999; Bulkeley 2012).

Recalling in the pleasant dreams the period of early adulthood can be perceived as a sign of a positive verification of the constantly activated in the real life issue that pertain to the family life of the early- and middle-aged adults, who remain strongly engaged in the development of their families and experience changes that take place within this system. Perhaps, in the case of older individuals, whose everyday life is connected with adjusting to the physical, psychological and social requirements of the old age, these accents are distributed on various issues that are connected with different periods of their entire life, which finds its reflection in their dreams.

An increased number of references to the period of late childhood in adolescents, young adults and middle-aged adults is linked to the period of starting their school education. In this period, a child faces many new developmental tasks. Apart from mastering skills necessary for acquiring, organizing and applying knowledge, developing the ability to read and write, finding a place in a peer group, a 7-year-old child faces a challenge of broadening and organizing the knowledge of him- or herself, not only in a descriptive sense, but also evaluative and normative. A developmental task of this period is also shaping attitudes towards groups and social institutions that will always be a part of the person's life. One of the more important tasks of this period is an active development of the self-image, which includes the knowledge and appraisals of the sphere of the child's activity, and achieving personal autonomy (Przetacznik-Gierowska, 1996). According to the SMS theory, some information connected with the realization of personal goals originate from the most recent experiences, some, on the other hand, come from (not necessarily conscious) internal sources, activated in response to these experiences (Horton et al., 2009). Perhaps, the early school-age period is significantly more important for our future lives than we expected.

The presence of unpleasant contents connected with the early school-age period in the dreams of the younger and middle-aged adults may result from the presence of educational threads in the adult life of these individuals. This issue can pertain to adults directly (e.g., studying, taking part in trainings, developing scientific / professional skills), or because of their growing up children. In everyday life of the older individuals these issues can have a less significant meaning, because, for the most part, they have already finished both their own education and the education process of their children.

The differences observed between the groups can be explained by difficulties in encoding unpleasant events.

Since the process of forgetting can start only after the events have been encoded, and encoding of unpleasant events takes place slowly (Maruszewski, 2011), in the memories incorporated into the dreams of the younger individuals there appeared events from this objectively difficult period of life. It is likely that the older individuals had already managed to get through the process of encoding the unpleasant events from the late childhood period, thanks to which they were able to forget them and, consequently, these threads did not appear in the contents of their dreams. This explanation can also be supported by the fact that the older participants recalled in their dreams the not so distant period of middle adulthood. Perhaps, linking current tasks with this period and the slow process of forgetting exert a joint influence on the process of including them into the contents of dreams, as they are constantly activated in the real life.

The recency effect. In line with the expectations, in the dreams of all age groups there could have been observed a marked recency effect: over 66% of the elements from the participants' dreams were connected with the events that took place during the last year. The obtain results are consistent with the results of Grenier and colleagues (2005).

The group of the middle-aged adults was the only one where no supremacy of the positive affect in respect of the recency effect could have been observed. Perhaps, the middle-aged individuals encounter many more difficulties in the current realization of important life goals than the representatives of the other age groups.

The characteristic distribution of the results for the last week before the occurrence of the dream is consistent with the results of numerous studies (e.g., Nielsen & Powell, 1992; Marquardt et al., 1996; Nielsen et al., 2004). Such results can be linked to a common mistake that results from referring to an external week scale, a mistake that people frequently make when they try to arrange the time of previous events (Stawiska, 2000; after: Maruszewski 2011).

If with the autobiographical memory base get connected only those few episodic memories that are associated with the person's life goals (Conway et al., 2004), it is possible that during sleep many current events are "considered" by the person as having potential consequences for the realization of his or her goals, which is why they are so frequently reflected in the contents of dreams.

Childhood amnesia. In line with the expectations, in the dreams of all investigated groups, the phenomenon of childhood amnesia could have been observed. According to the self-memory system model, in contents of dreams there appear information closely related to the Self, which come from the autobiographical memory resources (Horton et al., 2009). It is possible that memories from the period of early childhood do not appear in dreams, because they may not be significant for the present image of the Self. Also for that reason, in the dreams with a negative affective value there could have appeared sparse references to the period of early childhood, if they had been anyhow connected with the current experiencing of oneself.

The future

A generally low percentage of references to the future (10.6%) can be linked to the applied methodology. Although the participants could refer to future elements, this possibility was very restricted, and it pertained exclusively to a more distant future. The applied method did not enable the participants to refer the elements to events that were to take place in the nearest future.

The content and function of dreams. It is difficult to investigate the structure of dreams and cognitive processes that take place during sleep, because only some of their properties can be measured, and all details of dreams are available to an investigator exclusively via subjective descriptions that cannot be a subject of a strict scientific validation (Horton et al., 2008).

On the basis of the collected data, one can infer only to a limited extent about the temporal characteristic of dreams: a considerable part of the participants' dreams consisted of elements associated with different periods from their past and their future, whereas a markedly lower percentage of their dreams pertained to one specific day in their life (either in the past or in the future), wherein it seems that the dreams of the older individuals were more coherent in this respect.

Moreover, there is no basis for inferring about any other characteristic of dreams (e.g., unity of place), because it is possible that out of elements that are associated with different periods of life (people, feelings, sensations, objects etc.) a person built a coherent narration, characterized by unity of place and time. It is also probable that many elements that share the same time origin could form an incoherent in every other respect content. This diversity could support the thesis about "delirious" nature of dreaming that is compared by Hobson (2002) to states of delirium tremens, associated with consciousness disorders with illusions, delusions and hallucinations, illogical thinking and loss of short-term memory.

The structure of dreams seems to be, though, slightly more organized. If dreams are to be seen as a functional equivalent of autobiographical memories (Cappeliez, 2008; Montangero, 2012) that appear under a limited control of consciousness, the obtained results support the hypothesis about an increased availability of contents originating from specific life periods.

Perhaps, also McAdams' concept of narrative identity (1989, after: Oleś, 2002) can be applied here. Identity formation is a process that takes place over the entire lifetime, its particular elements come from different time periods and sources, thanks to which it is possible to extract a highly integrated personal story that includes threads from the past, the present and the expected future, in order to provide the person's life with coherence and sense. Arranging the narrative material, which includes seemingly inconsistent events, can take place not only via creating and telling one's own story when awake, but also via dreaming it. Lowering the level of conscious control, defense mechanisms and sense of social control during sleep make it possible to include also those aspects of oneself that are not accepted when awake.

The differences in respect of the reminiscence effect between the obtained results and the results of other authors (Grenier et al., 2005; Cappeliez, 2008) can stem from the applied methodology. In the present study, the participants were asked to indicate a memory with which the given element from their dream was most strongly connected. In studies conducted by other authors, in turn, the participants were asked to indicate the last event with which the given element was associated. Moreover, in the present study the author did not apply the categorization of dream elements used by Grenier and colleagues (2005) (characters, settings, objects, events and activities), the differentiation between *as is* / *generic* elements, and categories strictly defining the time intervals. In the study discussed in this paper, the author tried to eliminate the influence of external social control and preserve the autonomy and intimacy, typical of dreams.

Summary and conclusions

On the basis of the obtained results, one can observe the existence of certain analogies within autobiographical memory that manifests itself in the form of dreams and autobiographical memories recalled when awake: similarly as in the memory of autobiographical events, in dreams there also appears the recency effect, childhood amnesia and the reminiscence effect, wherein the last one, as opposed to the memory of events, does not emerge in the case of the older individuals, and in the case of the younger and middle-aged adults it pertains to different life periods for dreams with the negative and positive affective value.

Recalling in the pleasant dreams the period of early youth can be seen as a positive verification of the constantly activated in the real life threads, linked to the family life of the young and middle-aged adults. The participants of the reported studies were mainly students, i.e., individuals who develop, who strive to achieve a positive change. Perhaps, in groups oriented at maintaining *status quo* the results would have been different. It is possible that the older individuals, referring in their dreams to different life periods, integrate many diverse life threads.

It is not surprising that positive memories from early youth find their reflection in dreams, since it is a period of creating, building, novelty, strength, enthusiasm and hopes for the future. What attracts attention is the fact that the early school-age period leaves such a strong mark, that the memories from this period fill the contents our unpleasant dreams for many years (up to the period of middle-adulthood). Therefore, the results of the present study can be a source of reflection on the internal world, experiences and emotions of children in the early school-age period, and on consequences of these experiences in adult life.

The presence of elements connected with the future in the participants' pleasant dreams can trigger a reflection on the role of dreams in planning and maintaining persistent actions.

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APPENDIX

An exemplary description of a dream with distinguished elements and time references

I'm on a vacation with my friends. We live in a military unit. Soldiers march, I watch them and try to imitate them. One of the soldiers notices me, and smiles friendly at me. I feel very good.

| No. | Element from the dream | How long ago? | OR | How old was I? |
|-----|---|---------------|----|----------------|
| 1. | vacation (has just started) | 1 day | | ----- |
| 2. | friends (those from the dream are people with whom I spent time 2 years ago) | ----- | | 36 |
| 3. | military unit (the place from the dream reminds me of a military unit in which I lived during a summer camp when I was 12) | ----- | | 12 |
| 4. | soldiers (I saw soldiers yesterday on a train) | 1 day | | ----- |
| 5. | I watch someone (yesterday at a conference I watched speakers) | 1 day | | ----- |
| 6. | smiles (the soldier's smile is similar to the smile of my friend with whom I attended the conference yesterday) | 1 day | | ----- |
| 7. | I feel very good (the feeling from the dream is very similar to what I felt yesterday when I received a message from a friend whom I hadn't seen for I long time) | 1 day | | ----- |

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