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PART II REGULATIVE FUNCTIONS OF THE GIVEN TIME PERSPECTIVE

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Variability of the Relationship Between Mood and Social Zeitgeber

Abstract

Regularity in the emotional functioning of a human in specific time can be determined by cycles characterised by psycho-physiological and social changes. The objective of the research was to establish whether the population subjected to the research-related tests experienced daily and weekly mood variability and, if this relation has been confirmed, describe the latter. Mood was tested by means of the Positive and Negative Affect Schedule (Watson, Clark & Tellegen, 1988). Subjects judged their mood by means of two indicators (PA and NA) for one week, on a daily basis, and at 3-hour intervals. Daily and weekly variability was assessed by comparing averaged results obtained from all measurements carried out at specific times of the day and days of the week. The assessment of internal group differences was performed with repeated measures analysis of variance. The result obtained in the tests indicated the existence of daily differences of positive affect as well as weekly differences in relation to positive and negative affect.

Keywords: negative affect, positive affect, mood variability

Zmienność relacji pomiędzy nastrojem a społecznym Zeitgeber

Streszczenie

Regularność emocjonalnego funkcjonowania człowieka w określonym czasie może być determinowana przez cykle charakteryzujące się zmianami psychofizycznymi i społecznymi. Celem badania było ustalenie, czy populacja poddana testom towarzyszącym badaniu doświadczała codziennych lub tygodniowych zmian nastrojów oraz, jeśli taki związek został potwierdzony, opisanie go. Nastrój badany był za pomocą Listy Pozytywnego i Negatywnego Afektu (ang. *Positive and Negative Affect Schedule*, Watson, Clark & Tellegen, 1988). Badani oceniali swój nastrój według dwóch wskaźników (PA i NA) przez tydzień, codziennie, z odstępami co 3 godziny. Zmienność codzienna i tygodniowa oceniana była przez porównanie średnich wyników uzyskanych ze wszystkich pomiarów dokonywanych w określonych porach dnia i dni tygodnia. Oceny wewnętrznych różnic w grupie dokonano za pomocą powtarzalnej

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analizy pomiarów zmienności. Otrzymane wyniki wskazują na istnienie codziennych różnic afektu pozytywnego, jak również tygodniowych różnic w odniesieniu do afektu pozytywnego i negatywnego.

Słowa kluczowe: afekt negatywny, afekt pozytywny, zróżnicowanie nastroju

Introduction

Regularity of an individual's psychosocial functioning is determined by cycles characterised by social and psycho-physiological changes of different origin and diverse frequency. Due to recurrence one can distinguish the following cycles: circadian, circaseptan, monthly and annual (Clark et al., 1989; Cornelissen et al., 2005; Mitsutake et al., 2001; Murray et al., 2002, 2009).

The relation of changes in the intensification of positive and negative affect as well as cognitive efficacy in circadian and circaseptan rhythms has been studied before. It was already in the 30s of the 20th century that Otto Graf presented as a result of his research 'a physiological labour curve' ('physiologische Leistungskurve') showing changes in a man's efficiency at certain times of the day. The research conducted by Bo Bjerner and collaborators (1955) showed that a psychological and physical efficiency of most people reaches its lowest point at 12-hour intervals, i.e. around 3 a.m. and 3 p.m.

A discipline of science dealing with the analysis and description of repetitive life phenomena as well as identification of biological rhythms has been named chronobiology, whereas the science using such knowledge to boost health and life quality has been called chronomics (Halberg et al., 2009). Psychological aspects of the rhythms are dealt with by chronopsychology (Sędek & Bedyńska, 2010). Grandin and collaborators (2006) reviewed the Social Zeitgeber Theory and preliminary evidence supporting the thesis about the influence of social zeitgebers on circadian rhythm. An external trigger may first modulate or disrupt circadian rhythm, and second determine the weekly, monthly, and annual rhythms (Stephen et al., 2012). However, it is necessary to gain further evidence for both hypotheses. Affectivity is one of the most essential aspects of human functioning, yet the least explored. Researchers find it difficult to define affect (Forgas, 2007; Murphy & Zajonc, 1993); however, they agreed on the issue that affectivity may be considered as a positive and negative type of arousal within two orthogonal dimensions having their own physiological correlates (Watson et al., 1988).

The course of most psycho-physiological rhythms has been encoded in human cells and is controlled by the nervous structure, popularly referred to as the 'biological clock'. This structure is the suprachiasmatic nucleus located in the anterior part of the hypothalamus. The biological clock manages the rhythm regulating, among other things, the increase of the sympathetic nervous system tension during the day and its decrease at night. It also regulates the secretion of hormones such as cortisol, melatonin, serotonin, and testosterone at certain times of the day. It modulates body temperature as well as changes mood and cognitive efficacy in an

individual way in each human being (Furlan et al., 1990; Halberg et al., 2000, 2009). Individual differences in the course of circadian rhythms have been reflected also in the description of a chronotype which orients an individual to have a more effective evening affectivity ('owls') or morning affectivity ('larks') (Horne & Ostberg, 1976; Matthews, 1988).

Among a lot of research emphasising the importance of circadian rhythms for an individual's functioning there are also analyses of mood changes dependent on the time of the day (Clark et al, 1989; Cornelissen, 2005; Murray et al., 2009).

Various factors contribute to the adaptation of an individual to their life environment. These factors influence the biological clock and are called synchronisers or time markers. Circaseptan rhythms are synchronised mainly by social and cultural factors, among which the most important is the organisation of social life, working hours of schools and institutions, opening hours of shops, etc. (Terelak, 2008). For the social synchronisers (also called social nonphotic cues, zeitgebers) to be considered the source of the exogenous rhythms in the human body they need to be characterised by their own, relatively stable, rhythm and occur regularly with a certain frequency. The circaseptan rhythm is the only rhythm reflecting almost exclusively the influence of social synchronisers. Circaseptan rhythms similarly to circadian rhythms, may be registered by means of recording psycho-physiological functions of the body, such as fluctuation of heart parameters, temperature and hormones (Halberg, 2000).

The temporal aspect of human functioning has been highlighted by Lawrence A. Pervin's definition (2002). According to Pervin, personality consists of structures and processes which reflect not only a mutual operation of genes and environment, but also encompass a temporal aspect of human functioning, including 'memories of the past, mental representations of the present, and conceptions and expectations concerning the future' (Pervin, 2002).

Nico H. Frijda (1986) shares this cognitive approach by defining affect as a basic pleasant or unpleasant feeling aroused by cognitive interpretation and attribution of significance to a stimulus situation. Evaluation of a situation is made by an individual on the basis of criteria such as pleasantness, predicted easiness or difficulty of achieving a goal, possibility of controlling a situation, human agency, certainty of the outcome or predictability of consequences. Frijda's concept emphasizes the functional aspect of emotions and their adaptive functions. The level of adaptation and the vision of the future constitute a frame of reference for generated emotions.

Watson and collaborators (1999) use the term "dispositional affect" in order to differentiate the notion of affect from the notion of mood. Researchers describe affect as a relatively permanent disposition of personality regulating our reactions. Positive affect (PA) is distinguished irrespective of negative affect (NA). The type of an occurring emotion or mood may depend on the preceding affect (Frijda, 1986; Lazarus, 1991). Many papers emphasize the influence the affect has on cognitive and motivational processes in human behaviour.

The research of the changeability of positive and negative affect in a circaseptan rhythm conducted by Germaine Cornelissen and collaborators (2005) showed the regularity of affective cycles both within 24 hours (day and night) and within a week.

Assessing the endogenous circadian component of the mood variable, such as self-reporting of mood, provides methodological difficulties (e.g. sleep) and complicates data collection across the complete circadian cycle. Scott A. Golder and Michael W. Macy (2011), by data used from millions of public Twitter messages, described the collective variability mood of an entire population in cultures across the 84 countries in local time. Those measures (collective vs. individual) are different, however. First, the shapes of the mood rhythms were nearly identical across days of the week for both PA and NA. PA had two peaks (acrophase at 8 a.m. and 9 p.m.). Second, this relationship between mood peaks across days of the week (on weekend peaks occur 2 hours later than on the weekdays) was the same for each subject country (also in United Arab Emirates where the traditional work week runs Sunday to Thursday). This confirmed the influence of Social Zeitgeber on the weekly mood variability.

A high intensity of positive affect is connected with the smaller secretion of stress hormones (such as adrenaline, noradrenaline and cortisol). The researchers explain that this effect concerns people who are characterised by psychological flexibility and more often use their positive resources when confronted with stress-generating situations.

The objective of the research was to establish whether the population subjected to the research-related tests experienced daily and weekly mood variability and, if this relation has been confirmed, describe the latter. The goal of this study was to compare, or confirm the findings received in the American population.

Method

The differences between positive and negative affect were tested by means of PANAS (Positive & Negative Affect Schedule) developed by David Watson, Lee Anna Clark and Auke Tellegen (1988). The scale can be applied in various aspects of subjectively perceived time. By means of this tool, the subjects may specify how they feel at the moment, how they felt in a specific situation, or how they tend to feel (Crawford & Henry, 2004).

The scale makes it possible to test positive and negative affect in the context of a specific situation or to test the affectivity as a personality characteristic (Crawford & Henry, 2004). The subscales (PA and NA) are negatively correlated with each other on the level $r \approx -.3$ and individual test items within their scale are positively correlated with each other on the levels $r \approx .7/.8$, which confirms the accuracy of the scale (PANAS). The negative correlation between PA and NA scales may indicate that these affects are relatively independent from each other. In addition, this tool is characterised by good psychometric properties. The reliability of PA and NA of the PANAS test assessed using Crobach's Alpha amounts to .89 (95% *CI* = [.88, .9])

for the PA scale and .85 (95% *CI* = [.84, .87]) for the NA scale respectively. The scale contains 20 various affect-related states (20 test items). Ten of the test items are indications used to measure positive affect (PA scale), whereas the remaining items are used to measure negative affect (NA scale). Low, average and high results are determined on the standardisation basis. The minimum raw result in a given scale is 10 points, whereas the maximum raw result amounts to 50 points. Based on the standard tests carried by John R. Crawford and Julie D. Henry (2004), separate standards for PA and NA scales were developed; in doing so the percentile scale was applied. Filling out a questionnaire takes only a few minutes.

Participants and procedure

The tests engaged 117 participants (52.1% males, *M* = 23.5) students aged between 21 and 23. The subjects assessed their mood by means of the two aforementioned indicators (NA and PA) 6 times a day, seven days a week. The first measurement took place directly after waking up, with successive measurements timed every 3 hours, i.e. 3h, 6h, 9h, 12h and 15 hours after waking up. The entire study lasted three months.

Method of data analysis

Circadian rhythms refer to a cycle within an individual that is self-sustained and fluctuates roughly on a daily/24-hour cycle (Dautovuch, 2010, p. 15). Mood data was collected after waking up at fixed 3h intervals (with an expected loss of data due to sleep). Consequently, changeability which was assessed by comparing averaged results obtained on each day of the week, at specified times of the day, will be referred to as daily mood variability. Similarly changeability which was assessed by comparing averaged results obtained from all measurements carried out on a given day will be referred to as weekly mood variability. As averaged measurements on successive days and averaged measurements at specified times of the day collected from one group are obviously interdependent (correlated), the intergroup differences were subjected to repeated-measures analysis of variances. Two backgrounds were developed for each affect sign. In the first background, the factor of analysis was the day of the week; the factor had 7 levels. In the second background, the factor of analysis was the time of the day; this factor had 6 levels.

Results

Weekly variability of positive affect.

Presented in Figure 1 below are the results of repeated-measures analysis of variances for the variable of positive affect.

Table 1 presents the results of the tests of intra-object effects, revealing that various days are statistically significantly different to one another with reference to positive affect intensity of the same test participants. One should note, however, that the value of η^2 is very low, which means that the dependence is rather weak.

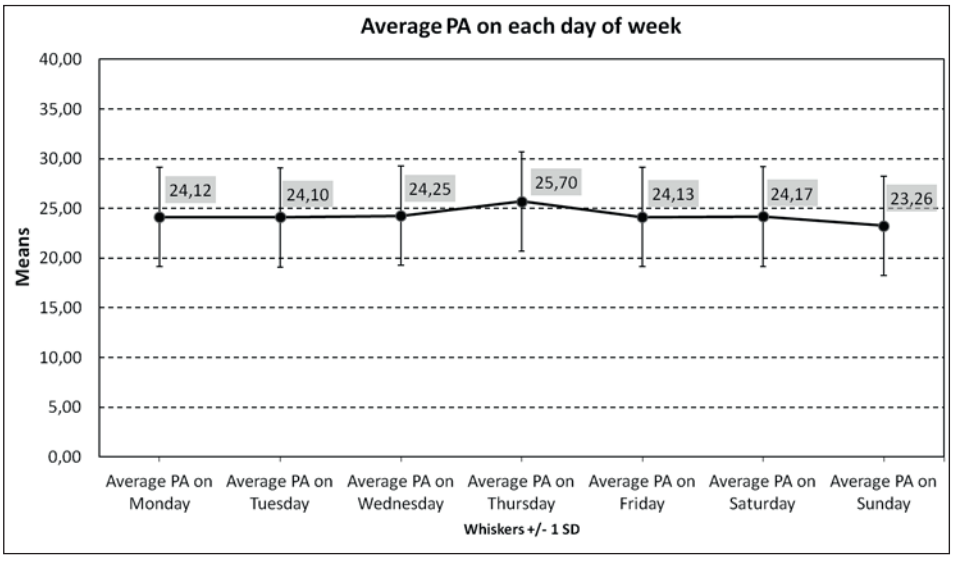

Fig. 1. Level of positive affect averaged on successive days of the week

Tab. 1. Results of tests of intra-object effects of positive affect – day of the week

Source		Sum of squares	*df*	Average square	F	Sig.	Partial η^2
Day	Assumed sphericity	362.025	6	60.337	3.547	.002	.030
	Greenhouse-Geisser	**362.025**	**4.484**	**80.731**	**3.547**	**.005**	**.030**
	Huynh-Feldt	362.025	4.689	77.211	3.547	.005	.030
	Lower-bound	362.025	1.000	362.025	3.547	.062	.030
Error	Assumed sphericity	11738.817	690	17.013			
	Greenhouse-Geisser	11738.817	515.701	22.763			
	Huynh-Feldt	11738.817	539.212	21.770			
	Lower-bound	11738.817	115.000	102.077			

In order to assess which days differ in positive affect, the former were compared in pairs. The results, presented in Table 2, reveal that on Thursday the intensity of positive affect is significantly higher than on the other days, whereas on Sunday it is lower than on the other days – on the level of significance or at least on the level of a statistical trend. The remaining days do not differ from one another.

Tab. 2. Comparisons of pairs of successive days of the week in relation to positive affect

(I) day	(J) day	Average difference (I-J)	Standard difference error	Sig.	95% range of difference confidence	
					Lower limit	Upper limit
Monday	Tuesday	.022	.430	**.960**	-.831	.874
	Wednesday	-.129	.473	**.785**	-1.066	.808
	Thursday	-1.576*	.573	**.007**	-2.712	-.441
	Friday	-.014	.594	**.981**	-1.192	1.163
	Saturday	-.050	.477	**.916**	-.994	.894
	Sunday	.855*	.391	**.031**	.080	1.629
Tuesday	Wednesday	-.151	.428	**.725**	-.999	.697
	Thursday	-1.598*	.530	**.003**	-2.647	-.548
	Friday	-.036	.678	**.958**	-1.378	1.306
	Saturday	-.072	.524	**.891**	-1.111	.967
	Sunday	.833	.503	**.100**	-.163	1.829
Wednesday	Thursday	-1.447*	.493	**.004**	-2.423	-.470
	Friday	.115	.629	**.855**	-1.131	1.360
	Saturday	.079	.527	**.881**	-.966	1.124
	Sunday	.984	.511	**.057**	-.028	1.996
Thursday	Friday	1.562*	.719	**.032**	.137	2.987
	Saturday	1.526*	.594	**.012**	.348	2.703
	Sunday	2.431*	.633	**.000**	1.177	3.685
Friday	Saturday	-.036	.536	**.947**	-1.097	1.025
	Sunday	.869	.567	**.128**	-.254	1.993
Saturday	Sunday	.905*	.424	**.035**	.065	1.745

Weekly variability of negative affect

Presented below in Figure 2 are the results of repeated-measures analysis of variances for the variable of negative affect.

Table 3 presents the results of the tests of intra-object effects related to the weekly variability of negative affect. The results reveal that on various days of the week, the intensity of negative affect is statistically and significantly different among the same test participants. One should note, however, that again the value of η^2 is very low, which means that the dependence is rather weak.

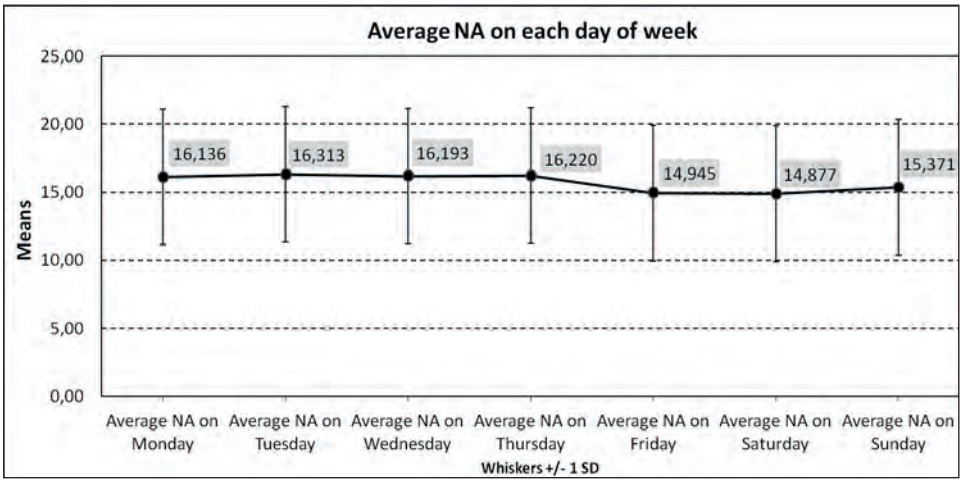

Fig. 2. Level of negative affect averaged on successive days of the week

Tab. 3. Results of tests of intra-object effects of negative affect – day of the week

Source		Sum of squares	*df*	Average square	*F*	Sig.	Partial η^2
Day	Assumed sphericity	276.540	6	46.090	3.464	.002	.029
	Greenhouse-Geisser	**276.540**	**5.248**	**52.691**	**3.464**	**.004**	**.029**
	Huynh-Feldt	276.540	5.529	50.017	3.464	.003	.029
	Lower-bound	276.540	1.000	276.540	3.464	.065	.029
Error	Assumed sphericity	9182.019	690	13.307			
	Greenhouse-Geisser	9182.019	603.555	15.213			
	Huynh-Feldt	9182.019	635.820	14.441			
	Lower-bound	9182.019	115.000	79.844			

In order to assess which days differ in negative affect, the former were compared in pairs. The results, presented in Table 4, reveal that on Friday and Saturday the average intensity of negative affect is significantly lower than on the other days except for Sunday, yet Friday and Saturday do not differ significantly from each other. The remaining weekdays do not significantly differ from one another. In case of Sunday, the results are lower than on the other days, yet the difference is significant only on the level a statistical trend.

Tab. 4. Comparisons of pairs of successive days of the week in relation to negative affect

(I) day	(J) day	Average difference (I-J)	Standard difference error	Sig.	95% range of ifference confidence	
					Lower limit	Upper limit
Monday	Tuesday	-.158	.405	**.697**	-.961	.644
	Wednesday	-.095	.517	**.855**	-1.118	.929
	Thursday	-.078	.482	**.872**	-1.032	.877
	Friday	1.194*	.473	**.013**	.258	2.130
	Saturday	1.227*	.571	**.034**	.096	2.358
	Sunday	.754	.458	**.102**	-.153	1.662
Tuesday	Wednesday	.063	.460	**.891**	-.849	.975
	Thursday	.080	.431	**.852**	-.773	.934
	Friday	1.352*	.453	**.003**	.455	2.249
	Saturday	1.385*	.480	**.005**	.434	2.336
	Sunday	.912*	.460	**.050**	.001	1.823
Wednesday	Thursday	.017	.427	**.968**	-.828	.862
	Friday	1.289*	.442	**.004**	.414	2.164
	Saturday	1.322*	.575	**.023**	.184	2.460
	Sunday	.849	.490	**.086**	-.121	1.820
Thursday	Friday	1.272*	.507	**.014**	.267	2.276
	Saturday	1.305*	.512	**.012**	.290	2.319
	Sunday	.832	.479	**.085**	-.117	1.781
Friday	Saturday	.033	.474	**.944**	-.905	.971
	Sunday	-.440	.466	**.347**	-1.362	.483
Saturday	Sunday	-.473	.462	**.308**	-1.388	.442

Daily variability of positive affect

Presented in Figure 3 below are the results of repeated-measures analysis of variances for the variable of positive affect.

Table 5 presents the results of the tests of intra-object effects, revealing that positive affect is significantly and statistically different depending on the time of the day. One should also note that the value of η^2 is significantly higher than in case of the so-far dependences, which means that the dependence/relation is significantly stronger. Daily differences of positive affect are significant.

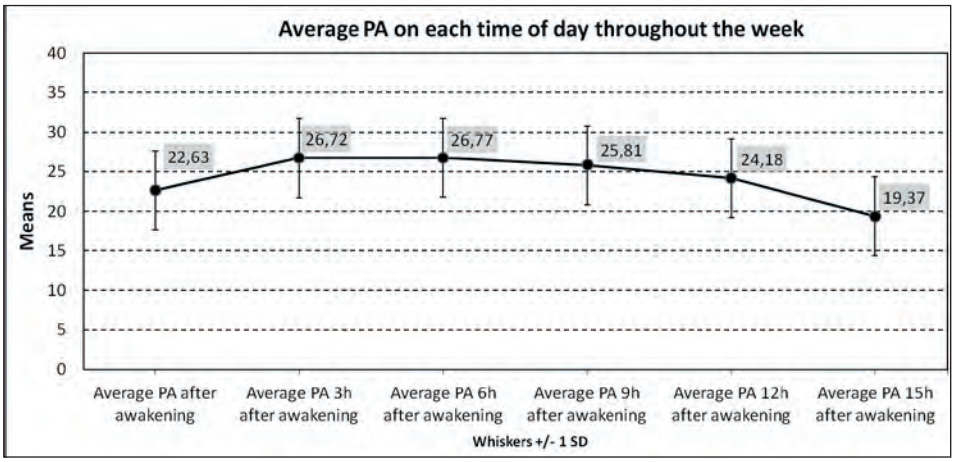

Fig. 3. Level of positive affect averaged at successive times of the day

Tab. 5. Results of tests of intra-object effects of positive affect – time of the day

Source		Sum of squares	*df*	Average square	F	Sig.	Partial η^2
Day	Assumed sphericity	4793.033	5	958.607	94.085	**.000**	.450
	Greenhouse-Geisser	**4793.033**	**3.261**	**1469.654**	**94.085**	**.000**	**.450**
	Huynh-Feldt	4793.033	3.368	1423.189	94.085	**.000**	.450
	Lower-bound	4793.033	1.000	4793.033	94.085	**.000**	.450
Error	Assumed sphericity	5858.542	575	10.189			
	Greenhouse-Geisser	5858.542	375.053	15.621			
	Huynh-Feldt	5858.542	387.298	15.127			
	Lower-bound	5858.542	115.000	50.944			

In order to assess which times of the day differ in positive affect, the former were compared in pairs. The results are presented in Table 6.

Tab. 6. Comparisons of pairs of successive times of the day in relation to positive affect

(I) time	(J) time	Average difference (I-J)	Standard difference error	Sig.	95% range of difference confidence	
					Lower limit	Upper limit
after awakening	after 3h	-4.085*	.370	**.000**	-4.817	-3.353
	after 6h	-4.142*	.405	**.000**	-4.943	-3.340
	after 9h	-3.175*	.419	**.000**	-4.005	-2.345
	after 12h	-1.544*	.520	**.004**	-2.574	-.515
	after 15h	3.262*	.543	**.000**	2.186	4.339

after 3h	after 6h	-.057	.228	**.804**	-.508	.395
	after 9h	.910*	.311	**.004**	.293	1.527
	after 12h	2.541*	.433	**.000**	1.683	3.398
	after 15h	7.347*	.521	**.000**	6.315	8.380
after 6h	after 9h	.967*	.239	**.000**	.493	1.441
	after 12h	2.597*	.412	**.000**	1.782	3.413
	after 15h	7.404*	.509	**.000**	6.396	8.412
after 9h	after 12h	1.631*	.329	**.000**	.978	2.283
	after 15h	6.437*	.454	**.000**	5.538	7.337
after 12h	after 15h	4.807*	.430	**.000**	3.955	5.659

The analysis of the results in the table indicates that all the times of the day differ as to the intensity of positive affect, except for the measurements after 3 and 6 hours, which in the group under discussion are insignificantly different. The intensity of positive affect proves low shortly after awakening and grows rapidly after 3 hours and remains on this level after 6 hours, while gradually decreasing after 9 and 12 hours, though failing to reach the level observed immediately after awakening. After 15 hours the intensity of positive affect falls sharply to an all-day low (lower than after awakening).

The results clearly indicate curvilinear dependence, best described by a second-degree polynomial and a parabolic curve; this being confirmed by the tests of intra-objects contrasts presented in Table 7. The effect described by the second-degree curve reaches the highest value of test *F*.

Tab. 7. Results of tests of intra-object contrasts of positive affect – time of the day

Source	dependence	Sum of squares	*df*	Average square	F	Sig.	Partial η^2
hour	linear	1027.465	1	1027.465	47.437	**.000**	.292
	square	**3621.059**	**1**	**3621.059**	**256.602**	**.000**	**.691**
	cubic	18.376	1	18.376	2.493	**.117**	.021
	4-th degree	126.108	1	126.108	22.860	**.000**	.166
error	linear	2490.861	115	21.660			
	square	1622.834	115	14.112			
	cubic	847.662	115	7.371			
	4-th degree	634.400	115	5.517			

Daily variability of negative affect

Presented below in Table 8 are the results of repeated-measures analysis of variances for the variable of negative affect.

Tab. 8. Results of tests of intra-object effects of negative affect – time of the day

Source		Sum of squares	*df*	Average square	F	Sig.	Partial η^2
Day	Assumed sphericity	34.038	5	6.808	1.579	**.164**	.014
	Greenhouse-Geisser	**34.038**	**3.306**	**10.297**	**1.579**	**.189**	**.014**
	Huynh-Feldt	34.038	3.415	9.967	1.579	**.188**	.014
	Lower-bound	34.038	1.000	34.038	1.579	**.211**	.014
Error	Assumed sphericity	2479.022	575	4.311			
	Greenhouse-Geisser	2479.022	380.149	6.521			
	Huynh-Feldt	2479.022	392.744	6.312			
	Lower-bound	2479.022	115.000	21.557			

It is clearly visible that the time of the day does not significantly differentiate the intensity of negative affect. Therefore, the comparisons of pairs were not carried out due to their groundlessness. Figure 4 illustrates the course of negative affect in case of daily mood variability.

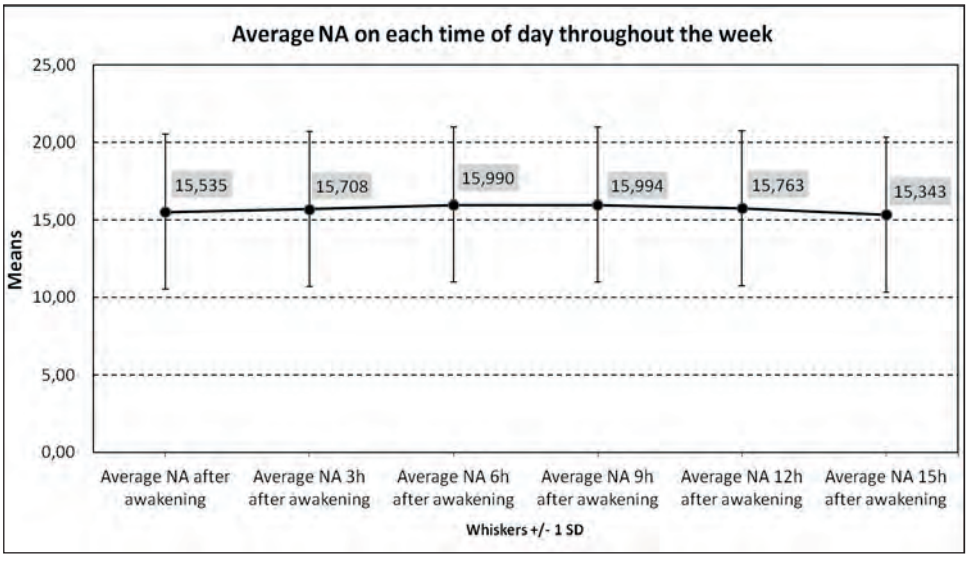

Fig. 4. Level of negative affect averaged at successive times of the day

Discussion

The objective of this research was to describe daily and weekly mood changes in experiencing positive and negative affects. Positive affect (PA) was taken into consideration as a factor independent of negative affect (NA). The research so far has shown that researchers using various testing methods recognize the circadian rhythm for both PA and NA. The latest analyses of circaseptan rhythms (Cornelissen

et al., 2005) provide evidence for the rhythmicality of affective experiences, although such analyses still requires confirmation in further research.

The results revealed that subjects from a Polish population experience a significantly higher positive affect on Thursday rather than on the other six days (it shows the difference between Polish and American groups of subjects). This seems to be interesting when we consider that the time difference between Europe and the United States is from 6 to 9 hours, and when in Poland it is Thursday, in the United States it is still Wednesday. Is circaseptan associated with other unexplored determinants, i.e. with the geomagnetic movement of the earth?

Positive affect is the lowest on Sunday. The result confirms the data gathered by Clark and Watson (1988) stating that the most intense positive emotions may be experienced during the working week as these are attached to social interactions. The researchers indicated that people tend to experience their best well-being, reported as high level of happiness, energy, and enthusiasm when they are socially and physically active. The analysis of the results also justifies the reasoning that Sunday as a day off, is not characterised by the highest indications of positive affect. Data gathered in other tests confirm that on Sunday many people report an increase in sadness and disengagement, which still remains unclear and is subject to further research (Watson, 2000). Possibly, the sense of being involved and included gives people the sense of belonging and being needed (Baumeister & Leary, 1995).

Research on the society of today indicates that in most countries the pace of life revolves around work; in western Europe being more intense than in Brazil, Indonesia or Mexico. On this list Poland occupies the twelfth position, being several places higher than the United States (Kwiatkowska & Sztuka, 2010). Human activity is increasingly characterised by a higher intensity of professional tasks carried out under time pressure and subject to growing requirements. While trying to reconcile professional challenges with their role in the family, humans may experience psychological tension and a sense of discomfort. While observing circaseptan changes, American researchers also noticed a weekly mood rhythm characterised by the gradual growth of the positive affect from Sunday till Tuesday, followed by its fall on Thursday and a slight growth towards the end of the week (Clark et al., 1989; Cornelissen et al., 2005). The weekend seems to be less characterized by positive affect due to the fact that anticipation of events is connected with more positive emotions than the experiencing of the actual events. It has been established that negative affect remains on a similar level on all weekdays except Friday and Saturday, when it drops slightly, only to start climbing again on Sunday and to remain the same for the subsequent days of the week. The obtained results have shown that during the week negative affect is slightly increased in comparison with the weekend, which may indicate that in spite of experiencing many positive emotions, we still experience independent negative emotions connected, for instance, with stress or tiredness.

The results of daily analyses show distinct differences within the scope of positive affect experienced at different times of the day. They confirm the presence

of the daily variability of positive affect. Similar data with reference to negative affect was not confirmed in the group subjected to testing. The so-far affect-related tests, including 3-hour intervals (Clark & Watson, 1988; Clark et al., 1989; Cornelissen et al., 2005; Murray et al., 2002, 2009; Porto et al., 2007), confirm circadian variation in positive affect. Researchers, who studied the American population (Clark et al., 1989; Cornelissen et al., 2005), indicated that positive affect grows during the day until afternoon to fall at night-time. Researchers analyse individual human potential by testing rhythms, e.g. circadian ones. The obtained results allow the conclusion that the daily emotional state is regulated by a biological clock (Mitsutake et al., 2001). In the surveyed Polish population, it was observed that positive affect increases until afternoon hours, then it reaches its peak and starts to decrease after nine hours after awakening to reach its lowest range at night – fifteen hours after awakening. What is interesting is that essential daily changes were not observed within the scope of negative affect, which proves that negative emotions remain on the same steady level throughout the day. Activity of the human reward system is partly determined by information generated by SCN which may explain first the daily variability of PA, and second no visible rhythm of NA.

Conclusions

Statistical results have indeed confirmed the rhythmic variability of positive affect in an individual in their daily activity as well as weekly rhythmicality within the scope of positive and negative affect. The analysis of the daily rhythm confirms the influence of the biological clock on the psycho-biological functioning of a human being (endogenous influence). Social synchronizers, such as periods regulated by social activity (professional or educational one), are most likely to also have influence. The observed weekly changeability of positive and negative affect occurs mainly as the consequence of social synchronizers. The knowledge about the rhythmicality affect in various populations may be used in preparation of social and occupational activities in the periods of the highest index for positive affect and avoidance of planning any activities in the periods of the highest negative index. The awareness of PA and NA rhythmicality allows planning the time of rest in the periods of the lowest positive affect index and the highest negative affect index. What is more, researchers studying mood should take under consideration differences between PA and NA in various parts of the day and week in tested groups.

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