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TECHNICAL PROFILES OF THE EXECUTION TIMES IN WEIGHTLIFTING, CLASS +105 KG

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Abstract

The remarkable results achieved by weightlifters at the 2017 European Championships held in Split, Croatia, demonstrate once again the need to find methods and means that help the human body to cope with mental and physical overexertion and to shorten the preparatory period necessary to reach European and World performances. The current level of sport performance in weightlifting requires reconsiderations of the training structure and design. We shall make these means available for specialists and athletes, focusing on a crucial issue in achieving weightlifting performances, namely the execution time. Given the particularities of this sport, where there are classes related to age, weight, gender and competitive level, but also the athletes' anthropometric and psychological particularities, it can be stated that the duration of execution times has a large variability. The research uses imaging techniques. The recording and measurement were performed with the AviSynth software made up of: electronic computer, JVS digital video camera, tripod, laptop, video-monitor and mini-video cassettes. The research presents the recording and analysis of execution times in the snatch event for European weightlifters from the value group A, heavyweight class +105 kg. The research includes eight male athletes (aged 19 to 32 years) from various countries, namely two athletes from Russia and athletes from Armenia, Czech Republic, Germany, Poland, Hungary and Ukraine, with one athlete each.

Keywords: Performance sport, execution time, male weightlifters.

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1. Introduction

Commentators in today's written and audio-visual media state that we are living in an era of information explosion. Due to the efficiency and speed of modern technology applications, such as computers, cameras, laptops, television, satellites and new printing methods, the latest discoveries, ideas, facts and theories come into our homes every day. It is increasingly difficult to keep pace with this, but it is even harder to understand what they mean (Spangenburg & Moser, 2001, p. 196).

Sport, in all its forms, can ensure not only the physical and mental health of the members of society, but also new ways of socialisation and personal fulfilment (Cristea, 2013, p. 394). In this context, the weightlifting sport, through its increased performance-related exigencies, requires the reconsideration of training. In this regard, we propose computerized assistance and video equipment as technical means of research within the specific training. Sport performance results from the interplay of a particularly large number of factors, whose weight is different both structurally and circumstantially. Performance is therefore the excellence (optimal) aspect of the human being regarded as a whole (Epuran, 2013, p. 249).

Behaviour can be modelled through computer programs derived from observations: in this case, the research process underlying the program starts from the behaviour observation, which can generate a theory (Paraschiv, Tănase, & Manea, 2014, p. 107).

Significant contributions to the study of intermediate execution times for the weightlifting events have been brought by the following researchers: V. I. Fronov, S. I. Lenkov, H. N. Efimov and M. P. Vangas. It is worth mentioning that the Italian weightlifting school has developed a model that divides the snatch style into 4 periods and 8 phases, and the clean and jerk style, also into 4 periods and 8 phases, when the barbell is separated from the platform and lifted to the chest, and 3 periods and 6 phases, when the barbell is lifted overhead (Urso, 2011, p. 28).

Video recordings were processed using the AviSynth software program, which was made available to us by the managers of the National Institute for Sport Research. It is about a Windows frame server developed by Ben Rudiak-Gould and Edwin van Eggelen, under the GNU GPL license (AviSynth, 2014).

Some authors believe that the speed with which the barbell is lifted depends on its weight and the athlete's sport mastery. With a heavier weight, the speed decreases, and the duration of initial acceleration decreases in direct relation with the sport mastery (Dvorkin, 2005, p. 230). The video method application by experts highlighted that the level of technical training has improved for each indicator assessing the phases of technical procedures (Ulăreanu, 2014, p. 108). The athletes' level of preparation for competitions is related to sufficiently stable characteristics which are not subjected to sudden fluctuations (motor qualities, potential of the most important functional systems, level of technical and tactical training, etc.) (Platonov, 2015, p. 386).

2. Problem Statement

Taking into account the rapid evolution of sport performance, it is necessary to reconsider all the factors of training and consequently the barbell lifting technique, more specifically to identify the time needed for lifting the barbell. This study brings to discussion the recording and analysis of execution times (from the moment when the weights leave the platform until the upper limbs are stretched with the

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barbell above). The study is part of an extensive research that aims, in a first phase, at all categories of athletes participating in weightlifting competitions. The research presents the recording and analysis of execution times in the snatch event for European weightlifters from the value group A, heavyweight class +105 kg.

3. Research Questions

The identification of execution times in the snatch event provides the opportunity to make comparisons between weightlifters, establish correlations and make observations on their performance.

4. Purpose of the Study

1. To check the possibilities of using the computerized imaging technique in barbell lifting, for the snatch event.

2. To identify execution times in snatch weightlifters through recording and measurement, using the AviSynth software program.

5. Research Methods

The research uses imaging techniques. It was conducted in two main stages: stage 1, from 03 to 13 April 2009, during which the selection took place (eight male weightlifters of international value from various European clubs, namely two athletes from Russia and athletes from Armenia, Czech Republic, Germany, Poland, Hungary and Ukraine, with one athlete each, aged 19 to 32 years and competing for the heavyweight class +105 kg) and the participating athletes were video-recorded; stage 2, from October 2016 to March 2017, when the results obtained from recordings (sorting the data, number of frames per execution, converting the frames into seconds, etc.) were processed and analysed using the AviSynth software program; drawing conclusions and making observations (based on the obtained results).

The most experienced competitor in this weight class is the Polish athlete aged 32 years, while the Czech competitor, who will take a deserved 5th place in the finals, is the youngest athlete, only 19 years.

6. Findings

To facilitate the identification of terms mentioned in the tables below, we give the following explanations: Time 1 (first contact of the soles with the competition platform); Time 2 (the feet are planted under the barbell axis); Time 3 (the hands grip the barbell); Time 4 (the barbell is separated from the competition platform); Time 5 (the barbell is fixed overhead); kg (lifted kilograms); S (successful attempt); F (failed attempt).

This research is part of a broader study, which is revealed in the structure of Tables 02, 03 and 04 that show both the value of concentration times for each athlete, but particularly the topic of the paper, namely “Technical profiles of execution times for the heavyweight class +105 kg in top performance weightlifting”, with reference to the eight participants in the value group A, aspirants for a place on the podium. The gold medal for this event is won by the athlete from Ukraine, who manages to lift the barbell

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in all three attempts, namely 195, 200 and 203 kg (203 kg in the third attempt). The 23-year-old European champion, as will be seen in the tables illustrating the three attempts (Tables 08, 09 and 10), has no failure in the snatch event. The second place comes to the 20-year-old athlete from Russia, P.E., with a weight of 193 kg, and the bronze medal goes to the athlete from Germany, who succeeds to lift 190 kg.

The research results highlight the following aspects: Structure of the two-hand snatch technique and duration of times – first attempt. Average execution speed for the first attempt is 3.63 sec. The difference between the fastest and slowest execution speed for the first attempt is 1.6 sec. (Table 02); Structure of the two-hand snatch technique and duration of times – second attempt. Average execution speed for the second attempt is 3.97 sec. The difference between the fastest and slowest execution speed for the second attempt is 1.84 sec. (Table 03); Structure of the two-hand snatch technique and duration of times – third attempt. Average execution speed for the third attempt is 4.23 sec. The difference between the fastest and slowest execution speed for the third attempt is 1.96 sec. (Table 04); Execution speed (in frames), which represents the difference between the barbell lifting off the platform (T4) and its fixing/lowering at the referee's signal (T5) (Table 05), highlights the objectification of execution times in the snatch event for the eight athletes in the heavyweight class +105 kg. Of the eight competitors, only one fails to lift the proposed weight in the first attempt; Difference between the barbell lifting off the platform (T4) and its fixing/lowering at the referee's signal (T5) – second attempt (Table 06). Analysing the structure of the two-hand snatch technique for the second attempt, it is found that only four of the eight athletes have managed to lift the proposed weights. A significant aspect is represented by the failed attempts of both athletes from Russia, for 185 kg and 193 kg. Unsuccessful attempts are also recorded by the athletes from Poland and Armenia; Difference between the barbell lifting off the platform (T4) and its fixing/lowering at the referee's signal (T5) – third attempt (Table 07). In the third attempt, five athletes managed to lift the proposed weights. The athlete from Russia fails again to stabilize the weight and, with the three failed attempts, he leaves the competition.

Table 01. Subjects of the research group

Item no.	Competition no.	Initials	Country	Date of birth	Body weight
1	34	O.J.	CZE	05.01.1989	116.52
2	44	N.P.	HUN	16.01.1986	142.35
3	54	V.A.	GER	22.08.1981	130.50
4	66	K.G.	POL	12.11.1977	131.80
5	88	L.I.	RUS	29.05.1986	112.73
6	157	A.R.	ARM	14.03.1990	141.98
7	207	P.E.	RUS1	17.08.1988	137.80
8	233	S.I.	UKR	27.05.1986	132.10

Table 02. Structure of the two-hand snatch technique and duration of times – first attempt

Item no.	Initials	Country	Time 1	Time 2	Time 3	Time 4	Time 5	Barbell weight (kg)	Successful/ Failed attempt
1.	O.J.	CZE	2229	2307	2408	2679	2788	165	Successful
2.	N.P.	HUN	5151	5347	5505	5608	5710	175	Successful
3.	V.A.	GER	7728	7863	8002	8470	8575	182	Successful
4.	K.G.	POL	9394	9517	9632	9682	9768	182	Successful

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5.	L.I.	RUS	11720	11892	12044	12400	F	185	Failed
6.	A.R.	ARM	14946	15048	15303	15468	15537	187	Successful
7.	P.E.	RUS1	16023	16151	16238	16280	16358	187	Successful
8.	S.I.	UKR	29591	29704	29846	29902	29989	195	Successful

Table 03. Structure of the two-hand snatch technique and duration of times – second attempt

Item no.	Initials	Country	Time 1	Time 2	Time 3	Time 4	Time 5	Barbell weight (kg)	Successful/ Failed attempt
1.	O.J.	CZE	3746	3873	4080	4221	4343	170	S
2.	N.P.	HUN	10590	10735	10905	11014	11109	182	S
3.	L.I.	RUS	12921	13017	13115	13399	F	185	F
4.	K.G.	POL	17070	17160	17366	17861	F	187	F
5.	V.A.	GER	18750	18860	18946	18977	19081	187	S
6.	A.R.	ARM	23862	24118	24408	24668	F	192	F
7.	P.E.	RUS1	27998	28105	28237	28258	F	193	F
8.	S.I.	UKR	30410	30575	30703	30738	30814	200	S

Table 04. Structure of the two-hand snatch technique and duration of times – third attempt

Item no.	Initials	Country	Time 1	Time 2	Time 3	Time 4	Time 5	Barbell weight (kg)	Successful/ Failed attempt
1.	O.J.	CZE	6436	6616	6760	6869	7023	175	S
2.	L.I.	RUS	13918	14000	14086	14338	F	185	F
3.	K.G.	POL	19772	19858	19969	20484	F	187	F
4.	N.P.	HUN	21411	21554	21665	21825	21933	188	S
5.	V.A.	GER	22880	22982	23103	23174	23288	190	S
6.	A.R.	ARM	25280	25589	25708	26009	F	192	F
7.	P.E.	RUS1	28547	28668	28748	28792	28862	193	S
8.	S.I.	UKR	31284	31399	31568	31622	31705	203	S

Table 05. Difference between the barbell lifting off the platform (T4) and its fixing/lowering at the referee's signal (T5) – first attempt

Item no.	Initials	Country	Time 4	Time 5	Barbell weight (kg)	Successful/ Failed attempt
1.	O.J.	CZE	2679	2788	165	S
2.	N.P.	HUN	5608	5710	175	S
3.	V.A.	GER	8470	8575	182	S
4.	K.G.	POL	9682	9768	182	S
5.	L.I.	RUS	12400	F	185	F
6.	A.R.	ARM	15468	15537	187	S
7.	P.E.	RUS1	16280	16358	187	S
8.	S.I.	UKR	29902	29989	195	S

Table 6. Difference between the barbell lifting off the platform (T4) and its fixing/lowering at the referee's signal (T5) – second attempt

Item no.	Initials	Country	Time 4	Time 5	Barbell weight (kg)	Successful/ Failed attempt
1.	O.J.	CZE	4221	4343	170	S
2.	N.P.	HUN	11014	11109	182	S

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3.	L.I.	RUS	13399	F	185	F
4.	K.G.	POL	17861	F	187	F
5.	V.A.	GER	18977	19081	187	S
6.	A.R.	ARM	24668	F	192	F
7.	P.E.	RUS1	28258	F	193	F
8.	S.I.	UKR	30738	30814	200	S

Table 07. Difference between the barbell lifting off the platform (T4) and its fixing/lowering at the referee's signal (T5) – third attempt

Item no.	Initials	Country	Time 4	Time 5	Barbell weight (kg)	Successful/ Failed attempt
1.	O.J.	CZE	6869	7023	175	S
2.	L.I.	RUS	14338	F	185	F
3.	K.G.	POL	20484	F	187	F
4.	N.P.	HUN	21825	21933	188	S
5.	V.A.	GER	23174	23288	190	S
6.	A.R.	ARM	26009	F	192	F
7.	P.E.	RUS1	28792	28862	193	S
8.	S.I.	UKR	31622	31705	203	S

Table 08. Identification of subjects and results achieved for the execution time – conversion of frames into seconds – first attempt

Item no.	Country	Date of birth	Body weight	Barbell weight (kg)	Attempt	Frames	Execution time
1.	CZE	21.09.1994	46.37	165	1st	109	4.36
2.	HUN	22.06.1982	47.67	175	1st	102	4.08
3.	GER	12.01.1988	47.88	182	1st	105	4.2
4.	POL	15.10.1988	47.63	182	1st	86	3.44
5.	RUS	19.02.1988	47.68	185	1st	F	F
6.	ARM	08.11.1992	47.88	187	1st	69	2.76
7.	RUS1	29.10.1983	47.71	187	1st	78	3.12
8.	UKR	29.10.1983	47.71	195	1st	87	3.48

Table 09. Identification of subjects and results achieved for the execution time – conversion of frames into seconds – second attempt

Item no.	Country	Date of birth	Body weight	Barbell weight (kg)	Attempt	Frames	Execution time
1.	CZE	21.09.1994	46.37	170	2nd	122	4.88
2.	HUN	22.06.1982	47.67	182	2nd	95	3.8
3.	RUS	12.01.1988	47.88	185	2nd	F	F
4.	POL	15.10.1988	47.63	187	2nd	F	F
5.	GER	19.02.1988	47.68	187	2nd	104	4.16
6.	ARM	08.11.1992	47.88	192	2nd	F	F
7.	RUS1	29.10.1983	47.71	193	2nd	F	F
8.	UKR	29.10.1983	47.71	200	1st	76	3.04

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Table 10. Identification of subjects and results achieved for the execution time – conversion of frames into seconds – third attempt

Item no.	Country	Date of birth	Body weight	Barbell weight (kg)	Attempt	Frames	Execution time
1.	CZE	22.06.1982	47.67	175	3rd	154	6.16
2.	RUS	21.09.1994	46.37	185	3rd	F	F
3.	POL	12.01.1988	47.88	187	3rd	F	F
4.	HUN	15.10.1988	47.63	188	3rd	108	4.32
5.	GER	19.02.1988	47.68	190	3rd	114	4.56
6.	ARM	08.11.1992	47.88	192	3rd	F	F
7.	RUS1	29.10.1983	47.71	193	3rd	70	2.8
8.	UKR	29.10.1983	47.71	203	1st	83	3.32

7. Conclusion

After analysing the research results, some issues related to the technical execution have been highlighted, and among them we mention: average execution speed for the three statutory attempts; average execution speed for each attempt; the ratio between barbell weight and execution speed.

Regarding the results obtained in this research, we mention the following aspects: average execution speed for the first attempt is 3.63 sec.; average execution speed for the second attempt is 3.97 sec.; average execution speed for the third attempt is 4.23 sec. The increase in the barbell weight leads to increased execution speed. The difference between the fastest and slowest execution speed is 3.4 sec.

Average execution speed for the three attempts is 3.94 sec. To determine the duration of times specific to the technical execution, we used the AviSynth program. Computerized technology, specifically the AviSynth software, provides the best premises for a multifactorial analysis, with a real impact on the achievement of top performance.

References

AviSynth. (2014). In *Wikipedia*. Retrieved from http://en.wikipedia.org/wiki/AviSynth

Cristea, D. (2013). *Tratat de psihologie socială* (Vol. 2). Bucureşti: Din condei.

Dvorkin, L. S. (2005). *Weightlifting. Textbook for high schools*. Sovetsky sport.

Epuran, M. (2013). *Motricitate şi psihism în activităţile corporale. Prolegomene la o metateorie a activităţilor corporale* (Vol. 2). Bucureşti: FEST.

Paraschiv, T., Tănase, V. I., & Manea, C. (2014). *Cibernetică psihologică*. Bucureşti: Hamangiu.

Platonov, V. N. (2015). *Periodizarea antrenamentului sportiv: Teoria generală şi aplicaţiile ei practice*. Bucureşti: Discobolul.

Spangenburg, R., & Moser, D. K. (2001). *Istoria ştiinţei* (Vol. 1: De la grecii antici la revoluţia ştiinţifică). Bucureşti: Lider.

Ulăreanu, M. V. (2014). *Influenţa mijloacelor specifice asupra dinamicii formei sportive a halterofililor de performanţă în ciclul anual de pregătire*. Bucureşti: Printech.

Urso, A. (2011). *Weightlifting: Sport for all sports*. Rome: Calzetti & Mariucci, EWF.