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Do The Non-Verbal Behaviors of Sprinters Before The Competition Affect Their Performance?

Kısa Mesafe Koşucularının Müsabaka Öncesi Sözsüz Davranışları Performanslarını Etkiliyor mu?

*Dilara Erkan[1], Işık Bayraktar[2], Ayşe Sibel Biçer[3]

[1]*Ankara University, Faculty of Sport Sciences, Ankara, TÜRKİYE / derkan@ankara.edu.tr /* 0000-0002-2403-4841
[2]*Alanya Alaaddin Keykubat University, Faculty of Sport Sciences, Antalya, TÜRKİYE / isik.bayraktar@alanya.edu.tr /* 0000-0003-1001-5348
[3]*Alanya Alaaddin Keykubat University, Faculty of Sport Sciences, Antalya, TÜRKİYE / sibel.bicer@alanya.edu.tr /* 0000-*0001-7793-9583*
* *Corresponding author*

Abstract: In the short-distance running branches of athletics, the athlete is expected to maintain his concentration and control his negative emotions before the start command. The body language of athletes can give important clues about their "true" inner state. For this reason, it is important to analyse the non-verbal behaviours of the athletes before starting the competition. In line with this importance, the aim of the present study is to analyse the pre-competition nonverbal behaviours of the athletes and examine their effect on their performance. 79 male athletes aged 18 and over competing in the 60-metre branch participated in the research. Since they were ready at the exit block, the time until the "to your places" command was recorded on video. The nonverbal behaviours of the athletes were analysed by using the BAP (Body Action-Posture) coding system through the recorded videos. Statistical analyses were made with the obtained numerical data. As a result of the analysis, it was found that the sprinters who exhibited the movements of "bringing the chest out, keeping the head down, keeping the left hand on the waist, keeping the right arm at the side, and keeping the right arm in front" had a significantly better time to finish the race than the others. As a result of this thesis study, it has been revealed that some non-verbal behaviours of the athletes explain a certain part of their performance. It has been discussed in this study that nonverbal behaviours can give clues about the mental state of the athlete as well as the outcome of the competition.

Keywords: Body language, behavioral analysis, athletics, sprinter.

Özet: *Atletizmin kısa mesafe koşu branşlarında sporcunun başlama komutundan önce konsantrasyonunu sağlaması ve olumsuz duygularını kontrol etmesi beklenir. Sporcuların beden dili, onların "gerçek" içsel durumları hakkında önemli ipuçları verebilir. Bu nedenle sporcuların müsabakaya başlamadan önce sözel olmayan davranışlarının analiz edilmesi önemlidir. Bu önem doğrultusunda mevcut çalışmanın amacı, atletlerin müsabaka öncesi sözel olmayan davranışlarını analiz etmek ve sporcuların performansları üzerindeki etkisini incelemektir. Araştırmaya 18 yaş ve üzeri 60 metre branşında yarışan 79 erkek atlet katılmıştır. Çıkış takozu başında hazır bulunduklarından "yerlerinize" komutu gelene kadar olan süre videoya alınmıştır. Kaydedilen videolar aracılığıyla BAP (Body Action-Posture) kodlama sistemi kullanılarak sporcuların sözsüz davranışları analiz edilmiştir. Elde edilen sayısal verilerle istatistiksel analizleri yapılmıştır. Analizler sonucunda "göğsün dışarı çıkarılması, başın aşağı eğilmesi, sol elin belde tutulması, sağ kolun yanda durması ve sağ kolun önde tutulması" hareketlerini sergileyen sprinterlerin yarışı bitirme sürelerinin diğerlerine göre anlamlı olarak daha iyi olduğu bulunmuştur. Sonuç olarak bu tez çalışması ile sporcuların bazı sözel olmayan davranışlarının performanslarının belirli bir kısmını açıkladığı ortaya konmuştur. Sözel olmayan davranışların sporcunun mental durumu hakkında ipucu verebileceği gibi müsabakanın sonucu hakkında da ipucu verebileceği bu çalışma ile tartışmaya açılmıştır.*

Anahtar Kelimeler: *Beden dili, davranış analizi, atletizm, kısa mesafe koşucusu*

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INTRODUCTION

From past to present, every living thing that exists on earth is in a constant exchange of information with both animate beings like itself and inanimate. Thanks to this exchange of information, communication has emerged. Human, by nature, is in communication with their environment. The need for individuals to communicate by exchanging information has brought along different types of communication according to the possibilities of the age they are in. The emerging types of communication were examined in three groups as verbal, non-verbal and written communication. Through non-verbal communication channels, which is one of the types of communication and the subject of the current research, people can reflect their internal states such as their emotions, thoughts, reactions, and attitudes. Throughout evolutionary history, these expressive behaviors in humans have gained a communicative value as they provide information to others about the individual's internal state (Furley & Schweizer, 2019).

Non-verbal behavior is defined as any communicative act that are not expressed in words (Furley & Schweizer, 2019). Through these behaviors, individuals can convey their opinions, personality tendencies, cognitive status information, and physical conditions such as fatigue; while the receiver can read the information, they need through non-verbal behaviors (Furley & Schweizer, 2019). Researchers who examine non-verbal behavior from an evolutionary perspective suggest that humans have evolved to be well-equipped to communicate their emotions, social intentions, and important internal states nonverbally and to interpret these messages (Darwin, 2021; Ekman, 1992; Shariff & Tracy, 2011). In addition to this information, Darwin (2021) reported that certain non-verbal behaviors are remnants of our habits that used to have adaptive functions. For example, the wrinkling of the nose when disgusted reduces the inhalation of a potentially toxic odor. Another example is to show teeth and squint when angry. In an animal attack, the prey will eventually be shredded by the attacker's teeth. Therefore, the teeth give the message of threat to the reseptors. Animals also squint to focus on its prey, narrowing their field of vision. Today, non-verbal expressions such as wrinkling the nose, showing teeth, and squinting continue to exist in humans, even though they no longer serve their original purpose (Darwin, 2021). People still exhibit similar actions when faced with a threat. This is an indication that certain non-verbal behaviors free themselves from their original biological functions (Furley & Schweizer, 2019).

Although non-verbal behaviors, which are referred to as Non-Verbal Behavior (NVB) in the related literature, generally provide accurate information about internal situations in natural environments, it is quite common to "imitate" these behaviors (Furley & Schweizer, 2019). In particular, the motive of maintaining its existence in environments that illustrate the competition in nature, such as sports, pushes the

athlete to display an image that indicates that they are strong and a threat to the outside. It has a similar purpose to the behavior of some animals that fluff their feathers to make themselves look bigger. An example of this is when an athlete walks with open arms to show themselves bigger when they enter the arena. Considering that athletes try to deceive their opponents about the intentions of their behavior, the idea of examining NVB in the context of sports becomes even more important (Güldenpenning et al., 2017; Kunde et al., 2011).

NVBs can occur unconsciously as well as consciously regulated. It is difficult for the observer to know whether non-verbal behaviors occur spontaneously or are consciously controlled. The complexity of this situation may adversely affect the reliability of the research. On the other hand, Darwin, who laid the foundations for NVB research, put forward “the leak theory” in their book 'Expression of Emotions in Man and Animals', arguing that muscles that are difficult to voluntarily activate are unusable in efforts to masking expressions (Darwin, 2021). This theory is a theory that eliminates the reliability problem of NVB research. In a recent study supporting the leak theory, it was concluded that professional referees' lack of confidence in their decision in questionable positions could only be detected by students studying at the faculty of sports sciences watching videos of decision moments (Furley & Schweizer, 2016). People's skills in perceiving and interpreting NVBs are undeniable, especially considering FIFA's emphasis on body language in the referees' rulebook (FIFA, 2016) and UEFA's training seminars include presentations on body language management in difficult decisions (UEFA, 2008).

There is evidence in the literature showing that effects such as pressure and fatigue shift in the balance between conscious and unconscious control of NVB towards unconscious control (Furley & Schweizer, 2016). Sports competitions, on the other hand, provide researchers with a conflict environment where NVBs are tried to be controlled and where there is intense pressure.

In the field of sports sciences, it is thought that the non-verbal behaviors that can be performed before the competition, during the competition and after the competition can give clues on many issues such as the attitudes of the athletes or sports stakeholders (referee, trainer, etc.) towards their duties, their mental states, their physiological and emotional readiness. Becasue of these reasons, as in the sports sciences, the aim of many scientific disciplines is to understand human behavior (Furley, 2019). Most of the human behavior interpreted to date has been performed in artificial situations. The approach used in the current research, on the other hand, provides an opportunity to make sense of the individual's behaviors that have evolved to adapt to their natural environment.

It is not known for certain whether non-verbal behaviors exhibited in the sports environment provide information about the prediction of performance. When the literature is examined, researches generally focus on NVBs made as a result of performance. Or research has been done on positive and negative emotions. In the research conducted by Vast et al. (2010), the concentration and performance of the athletes in the competition were examined according to the scales they filled before and after the competition. It was found that the performance and concentration of the athletes who were in a positive mood were better than the others. Considering the knowledge that internal states such as emotions are reflected in non-verbal behaviors, a prediction can be made between non-verbal behaviors before performance and competition. Another study is an NVB study on whether the celebration behaviors of footballers after successful penalty shootouts affect the outcome of the match (Moll et al., 2010). As a result of the research, it was seen that the teams exhibiting celebration behaviors with their teammates were victorious at the end of the match. Such studies can be multiplied. However, no study has been found that reveals a direct correlation between performance and NVB.

In the light of this information, the aim of this research is to analyse the non-verbal behaviors of sprinters before the competition by coding them with the BAP system and to examine the effect on the performance of the athlete.

METHOD

Participants

Sampling Group The accessible sampling method, which is one of the purposive sampling methods, was used to determine the research group (Cohen et al., 2000). The sample group of this research consists of 18-36 age group athletes competing in the senior category. Images of 300 athletes were taken within the scope of the research. After the exclusion criteria, the number of athletes included in the study was determined as 79. In the process of collecting the research data, video recordings were made in a total of seven 60m races. All the athletes in the video recordings were examined and included in the study according to certain criteria.

Inclusion criteria:

• In the images, all articulators of the athletes videotaped should be seen clearly.

• Videos taken directly in front of the athlete should be used.

• Coding should be done on videos where the beginning and the end of the movement are clearly visible.

Exclusion criteria:

• Videos with low image quality should not be used.

• During the video period, the images of the athletes who leave the frame and re-enter should not be analyzed.

• Images where at least one of the athlete's articulators is out of frame should be excluded.

• Series with DQ (disqualification) should be excluded due to lack of performance data.

Data Collection

Video footage of all volunteer participants was recorded at the Turkish Athletics Federation Atakoy Athletics Hall (Istanbul). The video camera is installed directly opposite the

60m running lane. All the athletes in the series appear in the videotape.

Figure 1. An example showing the participants' positions in the video recordings.

In order to avoid the risk of missing images, the time from the moment the athletes came to the starting blocks until the shooting started and the last athlete came to the arrival line was recorded. Each series was recorded in slow motion mode separately to avoid any confusion when editing images.

Body Language Analysis

This research aimed to examine the correlation between the performances of male athletes aged 18 and over, competing in the 60 meters branch, of their non-verbal behavior until the "on your marks" command, as they are at the beginning of the starting block. Coding non-verbal behaviors is a process independent of statistical analysis. In order for the data to be statistically analyzable, non-verbal digitization (coding) was completed first. Body movement and posture (BAP-Body Action Posture) coding system was used for body language analysis.

Body Movement And Posture (BAP-Body Action Posture) Coding System

It is a coding system developed using the Anvil template. ANVIL was written by Michael Kipp via Java (Kipp, 2001). It has provided an intuitive graphical user interface to simplify the coding process. There are detailed narration videos prepared by Michael Kipp (2012) on YouTub. Dael et al. (2012) used the ANVIL template in their research and identified 148 non-verbal behaviors. They adapted the interface of the software according to the coding procedure of these defined non-verbal behaviors. In addition, they presented the necessary files in their articles for other researchers to use.

A total of 141 behavioral variables reflecting internal states were identified in the body movement and posture coding system. The BAP system offers the opportunity to measure these behavior variables in different units.

Non-verbal behaviors are divided into two units(Furley & Roth, 2021). The first is the body posture unit, which is defined as the general alignment of one or more articulators (eg, trunk or extremities) with respect to a particular resting pattern of the body parts involved. Body posture units represent periodic changes, also known as posture shifts (arms crossed, body leaning back). The second one is the action units of the postures, which have a beginning and an end point. In the present study, action units with a beginning and an end were used.

The validity and reliability of the BAP system was measured by the agreement between the coders. All movement variables listed in the BAP chart were determined as movements resulting from a muscle contraction, not passive displacements caused by another limb. In the BAP user manual, the explanations specifying the aspects of behavior variables are written according to three orthogonal axes to ensure inter-practitioner objectivity. The direction of the movements is determined based on the sagittal, vertical and transverse axes according to the anatomical position. In the BAP user guide, the explanations of the behavior variables were made according to these three orthogonal axes (Dael et al., 2012).

Coding Procedure

The videos that were prepared for coding were coded according to the BAP procedure.

In the current study, 32 behavioral variables applicable to sprinters were selected (Appendix A.). Appropriate behavioral variables were determined by two faculty members, one from the Department of Coaching Education, one from the Department of Guidance and Psychological Counseling, and a researcher. Since the video shooting angle is from a single direction, in-depth behaviors such as pulling the chest backwards and bringing the head forward are excluded. In accordance with the purpose of this research, only the stance units of the articulators, which are modified and realigned, from reaching their final position to the end point were evaluated. The presence of the movement for the determined posture units was coded by assigning the number of times the same movement was repeated. For example, if the participant turned their head to the right five times during the video duration, the HTuR-PU (Turning the head to the right) stance unit was coded as “1”. Absence of movement is coded as “0”.

The videos are coded in a quiet and distracting environment. A video is watched from start to finish before starting to encode it. Then, the image is progressed frame by frame and the points where the behavior variables start, the variable takes its final position and the movement ends are marked. This process is repeated for each video.

Data Analysis

After the coding of non-verbal behaviors, various analyses were made in line with the research hypothesis.

Nonparametric tests were preferred because the coded non-verbal movements and competition performance times did not show normal distribution as a result of the statistical analysis. In the first stage, the Mann Whitney U test was used to determine the difference between the presence and absence of the movements exhibited by the athletes before the start. In the second stage, whether there is a relationship between the number of repetitions of the movements to be observed during the video period and the performance times of the athletes was analysed using the Spearman correlation test. The analysed movement units are indicated in separate tables

according to the hypotheses stated for each body region. The interpretation of Portney & Watkins (2002) was used to evaluate the correlation coefficients ($r \leq 0.49$ low correlation; $0.50 \leq r \leq 0.74$ moderate correlation; and $r \geq 0.75$ strong correlation). Regression analysis was conducted to determine whether the posture variables of the athletes had an effect on their competition performance. Epanechnikov Kernel correction was applied by using nonparametric regression method. Studies on nonparametric regression methods in the literatüre (Tezcan, 2011; Walker et al., 2022) were examined and R2 values were calculated with the regression formula suggested by Hayfield & Racine (2008) to be used in nonparametric measurement models.

RESULTS

There are the descriptive statistics of the research group, the statistical findings of the performance differences of the groups according to the presence-absence status of the movement variables, the correlation statistics for the determination of the relation between the frequency of the movement variables and the performance of the athletes in a section. In addition the results of the regression analysis to determine the effect of the related variables on the competition performance are given.

Descriptive statistics for the 60 m competition performances of the research group are given in Table 1.

Table 1: The mean, standard deviation, median and 25-75% values of the research group's performance levels

	n	X_{mean}	SD	Median	Percentiles	
					%25	*%75*
Year	79	21,3	3,4	20,0	19,0	22,0
Competition performance (s)		7,58	0,62	7,44	7,16	7,89

79 athletes participated in the study. The median age of the participating athletes was calculated as 20 years and the median value of their competition performance was calculated as 7.44 seconds.

Table 2: Examining the performance levels of sprinters according to the presence and absence of non-verbal behaviors.

Behavior variable	Presence status	n	Median	Percentiles (25-75)	Mean rank	Sum of ranks	Z	U	p
HTuL-PU	Absence	32	7,19	7,00-7,64	30, 36	982,50	2,971	454,500	***0,003****
	Presence	47	7,56	7,26-8,09	46,33	2177,60			
CU-PU	Absence	56	7,55	7,20-8,12	45,08	2524,50	-3,071	359,500	***0,002****
	Presence	23	7,17	7,01-7,44	27,63	635,50			

*HTuL-PU: Lateral head turn towards a left position; CU-PU: Chest movement towards an upward or forward position *p<0,05*

There is a statistically significant difference between the presence and absence of only "turning the head to the left" movements related to the head region and "pushing the chest out by pushing forward" movements related to the trunk region. In addition, it was observed that the performance of the athletes who did not perform the "turn of the head to the left" movement was better than those who did. It was determined that the performance of the athletes who exhibited the movement of "pushing the chest forward" was better.

The performances of the groups show similarity according to the presence-absence status of the other variables examined regarding the head region and the trunk region. In addition, no significant difference was found between the presence and absence of any of the arm and shoulder variables.

Table 3: Correlation results between the frequency of non-verbal behaviors of sprinters before exit and their performance.

		HVD-PU	HTuL-PU	CU-PU	LH waist	RA side	RA front
Competition performance (n=79)	rho	**-0,29****	**0,32****	**-0,35**	**-0,26***	-0,28*	-0,23*
	p	*0,01*	*0,004*	*0,002**	*0,02*	*0,01*	*0,04*
	R^2	**0,06**	**0,06**	**0,09**	**0,06**	**0,10**	**0,06**

HTuL-PU: Lateral head turn towards a left position; HVD-PU: Vertical head tilt towards a downward position; CU-PU: Chest movement towards an upward or forward position; LH waist: Left hand at waist Belde sol el; RA side: Right arm at side; RA front Right arm at front

It is seen that there is a relation between the "frequency of turning the head to the left" and "frequency of bending the head down" and the competition performances of the athletes.

A positive and statistically significant low level relation was found between the frequency of turning the head to the left and the race completion times of the participants (rho=0,32, p<0,05). As the frequency of head-turning movements of the athletes increases, the race performance times also increase. Therefore, it is understood that the athletes with a higher frequency of HTuL-PU movement exhibit a worse competitive performance. According to the results of the regression analysis, it can be said that this situation explains 6% of the changes in the competition performance of the athletes.

According to the indoor athletics hall plan, spectators are allowed in the stands to the right and opposite of the 60m running area. Therefore, the side where the athletes turn their heads to the left is the empty part of the hall.

On the other hand, a negative and statistically significant low-level relation was found between the sprinters' heads tilted down and time to complete the race (rho=-0,29, p<0,05). As the frequency of sprinters' head tilted down movements increased, it was observed that the participants' time to complete the race decreased. Athletes with a higher frequency of HVD-PU movement achieved a better grade. According to the results of the regression analysis, it can be concluded that this situation explains 6% of the changes in the performance of the athletes.

It is seen that there is a relation between the "bringing out the chest" movement, which is one of the movements related to the trunk area, and the competition performances of the athletes.

It has been determined that there is a negative and statistically significant low level correlation between the "bringing out the chest" movement and the competition performance times of the participants (rho=-0,35, p<0.05). As the frequency of the participants' chest movement towards forward increases, the competition performance times of the sprinters decrease. In other words, athletes with higher frequency of CU-PU movement performed better. According to the results of the regression analysis, it can be concluded that this situation explains 9% of the changes seen in the competition performance of the athletes.

It has been determined that there is a relation between the frequency of the left hand standing on the waist, which is one of the movements related to the left hand and the left arm, and the grades of the athletes. There is a negative and statistically significant very low-level relation between the frequency of holding the left hand on the waist and the race completion time of the participants (rho=-0,26, p<0,05). As the frequency of the movements of the participants to keep their left hands on their waists increases, the race performance times decrease. Therefore, athletes with a higher frequency of 'LH-waist' movement achieved a better competitive performance than others. In addition, according to the results of the regression analysis, it can be said that this situation explains 6% of the improvement in the competition performance of the athletes.

Correlation was calculated between the frequencies of the movements of the right hand and arm, the "right arm to the side" and the "right arm to stand", and the competition performances of the athletes.

A negative and statistically significant very low-level correlation was found between the frequency of keeping the right arm at the side and the results of the participants' competition (rho=-0,28, p<0,05). As the frequency of keeping the right arm at the side of the participants increases, the times to complete the race decreases. Athletes with a higher frequency of exhibiting the 'RA-side' movement before the start performed better. According to the results of the regression analysis, it can be said that this situation explains 10% of the changes in the competition performance of the athletes.

It was found that there was a negative and statistically significant very low-level relation between the frequency of keeping the right arm forward and the race performance times of the athletes (rho=-0,23, p<0,05). As the frequency of keeping the arms forward of the athletes increased, the time to complete the race decreased. The sprinters who performed the 'RA-front' movement more frequently finished the race with a better performance rating than the others. In addition, according to the results of the regression analysis, it was seen that this situation could explain 6% of the changes in the competition performance of the athletes.

In addition, there was no statistical relation between the frequency of shoulder movements and their performance.

DISCUSSION AND CONCLUSION

Although sports performance results in numerical values, in some cases, performance evaluation is left to the judgment of the person (coach, referee, competitor, teammate, etc.) (Plessner & Haar, 2006). For example, a decision to be made in football can be evaluated at the discretion of the referee. A football player can also use the image he/she wants to create to influence the referee's decision. However, in the athletics branch, the referee is not required to evaluate a situation belonging to the athlete during the race on their own initiative. Because the only output of performance is time, which is an objective result. For this reason, there is no outside judgment. The body languages that the athletes display consciously do not aim to impress the referee, but either to motivate themselves or to create an impression against to the opponent/spectators. Athletes can exhibit these behaviors consciously as well as unconsciously. Their unconscious body language may be a clue to their inner state at that moment. It is known that the negative emotions and positive emotions of the athletes affect their performance positively or negatively (Vast et al., 2010). Therefore, these

internal state clues gain importance for outcome information. In one study, random images were played from timeout footage of a team's basketball games. The researcher told the participants: "The basketball players you watch play for the opposing team. Do you think you can beat this team?" Participants were asked to answer the question by scoring from 0 to 11. As a result of the research, the participants stated that they would be able to beat statistically more in videos where the difference was against the team, they watched (Furley & Schweizer, 2014). Although this result does not indicate which non-verbal behaviors individuals respond to, it may lead to the conclusion that non-verbal behaviors of athletes are an indicator of their performance. Another assumption made considering the results of this research is that the sprinter has a social cognitive bias about their own performance. Social cognition is the general study of how people make sense of other people and themselves on the basis of an information processing framework (Plessner & Haar, 2006). By processing social information such as their own past experience, best rating, training status, and athlete history of their rival friends, the athlete makes a social cognitive bias about their performance. This bias can be reflected in the athlete's behaviors and feelings such as self-confidence and insecurity.

In the current research, many non-verbal behaviors, whether voluntary or involuntary, were analyzed before the athletes started the race. In this direction, a significant difference was found between the presence and absence of the head rotation to left (HTuL-PU) movement (Table 2). The median value of the race performance times of the athletes exhibiting the movement of turning the head to the left was higher than the median value of the racing performance times of the athletes who did not exhibit the same movement.

A positive and low-level relation was found between the frequency of turning the head to the left (HTuL-PU) and the performance of the athletes (Table 3). The performance of the athletes with a high frequency of head-turning movements is worse than the others. The high time to complete the race represents a lower performance in the athletics branch. In the competitions where the videos were shot, a residence permit was given in the stands on the right and opposite sides of the athletics hall, and the stands on the left side were left empty. Therefore, sprinters turned their gaze to the empty space on the left with their heads through the movement of turning the head to the left. It has been stated that eye contact is one of the oldest and most effective tips in the teaching-learning process (Bissa & Sharma, 2010). According to Bissa & Sharma (2010), students' avoiding eye contact with the teacher can be read as lying, lack of self-confidence or trying to keep something secret. It is thought that the poor performance of the athletes who exhibit the movement of turning the head to the left and repeat this movement more often than other athletes can be explained by the social cognitive bias that the athlete has made about themself. The fact that the athletes with worse performance perform the movement of turning their heads to the left may also be due to their insecurity about their own performance.

The body language movements exhibited by individuals aim not only to appear strong but also to survive from time to time. According to evolutionary psychology, non-verbal dominance and submissive expressions can be quick and productive information on issues such as rank and status in social animals (Darwin, 2021). Sending submissive signals to the receiver, which is potentially dominant in conflict situations, sometimes enables individuals to avoid a vital conflict (Furley et al., 2012). In the research, head-down posture (HVD-PU), which has statistically significant results, is among the submissive behaviors in the sources related to reading and interpreting NVBs (Carney et al., 2005). Submissive behaviors presented in the competition create a weak player perception in the opposing athlete (Furley et al., 2012). In the current study, it was observed that sprinters with frequent head-down movements performed better than others (Table 3). Submission behavior may have been presented by the sprinters as a deceptive move against the opponent. Although in the study of Furley et al. (2012) head tilt movement is statistically significantly associated with negative emotions, it is noteworthy in the current research that athletes with a high frequency of HVD-PU (head down) get a good racing performance rating. As a result of the regression analysis made in the current study, the finding that the frequency of bowing the head down could explain 6% of the athlete's performance suggested that it may have been used as a deceptive move.

As another research finding, a negative and low-level relation was found between the frequency of bringing out the chest (CU-PU) and the performance of the athletes (Table 3). In addition, a negatively and very low-level relation was found between the frequency of holding the left hand on the waist (LH waist) and the race performance times of the athletes. Based on these findings, the performances of the athletes who perform the movements of pushing the chest forward, that is, expanding the chest and holding the left hand on the waist, are better than the others. With these movements, it is thought that the athlete expresses their inner states such as self-confidence and pride. Looking at the literature, it is seen that enlarged chest movement is more associated with a sense of pride (Carney et al., 2005; Moll et al., 2010). Likewise, the gesture of keeping the hands on the waist represents pride (Moll et al., 2010). The movement of bringing the chest towards forward and keeping the hands at the waist allow the body to cover a larger area. At the same time, it supports the behavior of the creature to present a strong image. According to the results of the regression analysis conducted in the current study (Table 3), it was seen that the frequency of the chest towards forward movement could explain 9% of the sprinter's competition performance. It is thought that the efforts of the athletes participating in the research to expand their bodies may be a behavior habit they brought from the past. When the hypotheses (Andreas De Block & Siegfried Dewitte, 2008; Deaner et al., 2016; Lombardo, 2012) in the literature about why people develop tendencies to do sports and watch sports are examined, it is seen that sports is a form of self-expression for primitive people. According to the dual inheritance theory, it is known that people inherit their behavior through genes and culture (Furley, 2019). Therefore, it is thought that the behaviors in the sports environment, which were used as a form of self-expression by people at the beginning, are likely to continue today. In this direction, the knowledge that the physical health and large appearance of the athletes participating in the research will lead to positive results brings to mind the claim of being one of the behaviors transferred by learning.

When Table 3 is examined, a negative and statistically significant low-level relation was found between the frequencies of keeping their right arms at the side (RA side) and the frequencies of keeping their right arms forward (LA front) and the race performance of the athletes. The fact that the right hand of the sprinters participating in the research is more frequently held at the side and in front means that their right hand is constantly in motion. The right hands perform different movements and are positioned on the side and front again. Navarro & Karlin (2020)state that people cannot suppress their arm movements when they are excited. These movements means that in happy and energetic moments, the arms try to go against gravity. Especially the frequency of keeping the right arm at the side and keeping it in front suggested that the movements of the actively used hand might not have been restricted. About 85-90% of the human population use their right hand. The remaining 10-15% prefer to use their left hand (Bakırcı, 2013). Yet another paper states that 70% to 90% of people use their right hand (Wilkins, 2011). On the one hand, the positive emotions of the athletes trying to create a strong image may have been leaked by the right arm. Similar to the current study, Furley & Roth (2021) found that football players who made a successful penalty shoot unexpectedly had more right arm movements.

As a result, in this study, it has been revealed that some non-verbal behaviors of the athletes, regardless of whether they are voluntary or involuntary, affect their performance. The idea that non-verbal behaviors can give clues about the mental state of the athlete, as well as give clues about the result of the competition, has also been discussed with this study. In this study, it was observed that while some behaviors affected performance positively, only the movement of turning the head to the left negatively affected performance. When all this information is examined, the analysis of non-verbal behaviors is important for coaches and athletes. A coach who observes their athlete before the competition may have prior knowledge of their athlete. Having information about the mental state of the athlete, the coach will be able to make future trainings and preparations based on the non-verbal behaviors of the athlete.

Recommendations

It is recommended that trainers be trained in nonverbal behaviours and their analysis. It is recommended to have non-verbal behaviour analysts within the scope of sports management. Researchers or trainers are recommended to use the BAP coding system or similar procedures during analysis. In future research, holistic studies, including different coding systems for the lower extremities, can be done. It is recommended that researchers do more studies on the related subject.

Ethical Considerations: The present study adhered to the guidelines for journal writing, publication principles, research and publication ethics, and journal ethics. The author bears responsibility for any potential violations that may arise in relation to the article. This research was approved by Alanya Alaaddin Keykubat University Health Sciences Ethics Committee (E-70561447-050.01.04-70607). After obtaining the necessary permissions from the Turkish Athletics Federation, video recordings were taken within the framework of ethical rules.

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GENİŞLETİLMİŞ ÖZET

Çalışmanın Amacı: Bu araştırmanın amacı atletizm sporunda kısa mesafe branşındaki atletlerin çıkış öncesi sözsüz davranışlarının BAP sistemi ile kodlanarak analiz edilmesi ve sporcunun performansına olan etkisinin incelenmesidir.

Araştırma Soruları:

- Atletin kafa hareketleri ile performansı arasında bir ilişki var mıdır?
- Atletin gövde hareketleri ile performansı arasında bir ilişki var mıdır?
- Atletin el-kol hareketleri ile performansı arasında bir ilişki var mıdır?
- Atletin omuz hareketleri ile performansı arasında bir ilişki var mıdır?

Literatür Araştırması: Sözel olmayan davranışlar sözsüz iletişimin bir kanalı olarak yer almaktadır (Wiener vd., 1972).

Kısaca kelimelerle ifade edilemeyen herhangi bir iletişim eylemi şeklinde tanımlanmaktadır (Furley ve Schweizer, 2019). Bu davranışlar sayesinde bireyler görüşlerini kişilik eğilimlerini, bilişsel durum bilgilerini ve yorgunluk gibi fiziksel durumlarını iletebilirken psikopatolojiler, değerler gibi birçok bilgi de alıcı tarafından algılanabilmektedir (Furley & Schweizer, 2019). Sözel olmayan davranışları evrimsel açıdan inceleyen araştırmacılar insanların, duygularını, sosyal niyetlerini, önemli içsel durumlarını sözsüz olarak iletme ve bu iletileri yorumlama açısından iyi donanımlı olacak şekilde evrimleşmiş olduklarını öne sürmektedir (Darwin, 2021; Ekman, 1992; Shariff ve Tracy, 2011). Bu bilgilere ek olarak Darwin, belirli sözel olmayan davranışların eskiden adaptif işlevlere sahip olan alışkanlıklarımızın kalıntıları olduğunu bildirmiştir. Örneğin, tiksinti duyulduğunda sergilenen burun kırıştırma hareketi zehirli olabilecek bir kokunun solunmasını azaltmaktadır. Günümüzde ise burun kırıştırma gibi sözsüz ifadeler artık asıl amaçlarına hizmet etmeseler de insanlarda varlığını sürdürmeye devam etmektedir (Darwin, 2021). İnsanlar bir tehditle karşı karşıya kaldığında halen benzer hareketler sergilemektedir. Bu durum belirli sözel olmayan davranışların kendilerini orijinal biyolojik işlevlerinden kurtardığının bir göstergesidir (Furley ve Schweizer, 2019).

İlgili alanyazında Non-Verbal Behavior (NVB) olarak ifade edilen sözel olmayan davranışlar genellikle doğal ortamlarda içsel durumlar hakkında doğru bilgi verse de bu davranışların "taklit edilebilmesi" oldukça yaygın bir durumdur (Furley ve Schweizer, 2019). Özellikle spor gibi doğadaki rekabeti illüstire eden ortamlarda varlığını devam ettirme güdüsü sporcuyu dışarıya karşı güçlü ve tehdit unsuru olduğunu belirten bir imaj sergilemeye iter. Kendisini iri göstermek için tüylerini kabartan bazı hayvanların davranışlarıyla benzer amacı taşımaktadır. Bir sporcunun arenaya çıktığında kendini iri göstermek için kollarını açarak yürümesi bu duruma bir örnek olarak gösterilebilir. Sporcuların rakiplerini kendi davranışlarının niyetleri hakkında aldatmaya çalıştıkları düşünüldüğünde NVB'nin spor bağlamında incelenmesi fikri daha da önem kazanmaktadır (Güldenpenning vd., 2017; Kunde vd., 2011).

NVB'ler otonom olarak ortaya çıkabildiği gibi bilinçli olarak da düzenlenmektedir. Literatürde baskı ve yorgunluk gibi etkilerin NVB'nin bilinçli ve bilinçsiz kontrolü arasındaki dengeyi bilinçsiz kontrole doğru kaydırdığını gösteren kanıtlar mevcuttur (Furley ve Schweizer, 2016). Spor müsabakaları ise araştırmacılara hem NVB'lerin kontrol edilmeye çalışıldığı hem de yoğun baskının olduğu bir çatışma ortamı sunmaktadır.

Spor bilimleri alanında müsabaka, öncesi müsabaka sırası ve müsabaka sonrası gerçekleştirilebilen sözsüz davranışlar sporcuların ya da spor paydaşlarının (hakem, antrenör vb.) görevlerine yönelik tutumları mental durumları fizyolojik ve duyuşsal hazır bulunuşlukları gibi birçok konuda ipuçları verebileceği düşünülmektedir. Sözsüz davranışların analizinde kullanılan geleneksel metotların subjektif verilere dayanabileceği riski, hareketlerin hızlı olabileceği ihtimaline yönelik gözden kaçma olasılığı ve hareketin tekrar edilemez olma durumu bu tarz çalışmaların güvenilirliğini etkileyebileceği düşünülmektedir. Çok sayıda bilimsel disiplinin amacı, insan davranışını anlamaktır (Furley, 2019). Bugüne kadar anlamlandırılan insan davranışlarının çoğu, yapay durumlarda gerçekleşmiştir. Araştırmada kullanılan yaklaşım ise bireyin doğal ortamına uyum sağlamak üzere evrimleşen davranışlarını anlamlandırma imkânı sunmaktadır.

Yöntem: 18 yaş ve üzeri 60 metre branşında yarışan 79 erkek atletin çıkış takozu başında hazır bulunduklarından "yerlerinize" komutu gelene kadar olan görüntüleri video kamera cihazı aracılığıyla kaydedilmiştir. Video kamera, 60m koşu kulvarının tam karşısına bütün atletler görülecek şekilde kurulmuştur. Görüntüler toplandıktan sonra videoların düzenlenmesi süreci başlamıştır. Yarışma tarihlerine göre klasörlere ayrıldıktan sonra her video ayrı ayrı izlenmiş ve yarışma seri numaraları ile isimlendirilmiştir. İsimlendirilen videolardan atletlerin hazır bulunmalarından "yerlerinize" komutu gelmesine kadar olan kareler kırpılarak kodlanmaya hazır hale getirilmiştir. Daha sonra sözsüz davranışların analizi için sprinterlerin bulunduğu bağlamda uygulanabilir davranış değişkenleri seçilmiştir. Kodlayıcının kodlama yaparken takip etmesi gereken kullanım kılavuzu, alanında uzman bir Antrenörlük Anabilim Dalı'ndan, bir de Rehberlik ve Psikolojik Danışmanlık Anabilim Dalı'ndan iki öğretim üyesi ve bir araştırmacıyla Türkçeye çevrilerek kodlama için hazır hale getirilmiştir. Sözsüz davranışların kodlanması, video başına ortalama 10-20 dk sürmüştür. Videoların kodlanması sırasında sessiz ve dikkat dağıtıcı değişkenlerin olmadığı bir ortamda gerçekleştirilmiştir. Bir videoda kodlamaya başlanmadan önce baştan sona izlenmiştir. Ardından görüntü kare kare (frame) ilerlenerek davranış değişkenlerinin başladığı, değişkenin son konumunu aldığı ve hareketin bittiği noktalar işaretlenmiştir. Bu işlem her video için tekrarlanmıştır. Daha sonra elde edilen verilerin istatistiksel analizi yapılmıştır.

Sonuç ve Değerlendirme: Sonuç olarak bu tez çalışması ile sporcuların istemli ya da istemsiz olmasına bakılmaksızın yapmış oldukları sözsüz bazı davranışların performanslarını etkilediği ortaya konulmuştur. Sözsüz davranışların sporcunun mental olarak ne durumda olduğu hakkında ipucu verebileceğinin yanı sıra yarışma sonucu hakkında da ipucu verebileceği durumu bu çalışma ile tartışmaya açılmıştır. Bu araştırmada, bazı davranışlar performansı olumlu yönde etkilerken yalnızca kafanın sola çevrilmesi hareketinin performansı olumsuz etkilediği görülmüştür. Tüm bu bilgiler incelendiğinde sözsüz davranışların analizi antrenörler ve sporcular için önem arz etmektedir.