

Factors influencing Artistic Choreography in the Individual Women Category in Aerobic Gymnastics with Special Regard to Transitions

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Abstract

The 'Transitions' component of Aerobic Gymnastics was analyzed both for the routines of the champion who achieved the highest artistic score ever in the category of Individual Women and for the eighth ranked player who obtained the lowest artistic score in the final of the 11th Aerobic Gymnastics World Championships. The champion generally took a longer time to perform a string of transition than did the eighth ranked player. While the eighth ranked player utilized many jump movements, the choreography of the champion was composed of variety of movements, supporting points, degrees and way of rotation around three axes. The routine of the champion also effectively mixed transitions with long and short trajectories, and used all zones evenly. The eighth ranked player stayed in limited zones most of the time. These results suggest that (1) the champion's transitions were choreographed with high intensity, variety and complexity, and with excellent in balance for the types of trajectory and usage of all zones within the competition area; and (2) the champion's characteristic-transition was choreographed with constant intensity so that it could be regarded as an independent component with rich content.

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Introduction

Aerobic Gymnastics originated from traditional aerobic exercise, but has since developed into a mode of expression that requires the performance of continuous complex and high intensity movements in relation to music. An Aerobic Gymnastic routine within an individual category is composed of (1) aerobic movement patterns (AMP), (2) difficulty elements (DE), (3) transitions, and (4) linking. The best routines will have

clean and balanced movements combined with perfect technique.

The final score in a competition is comprised of (1) an artistic score, (2) a difficulty score, and (3) an execution score. A perfect artistic performance would receive 10 points. The artistic score is composed of the choreography of the composition (max.4 points), aerobic content (max.3 points) as well as presentation and musicality (max.3 points). Choreography is a critical part

of the artistic evaluation. As often noted (Griogore, 2002; Manos, 2008), 'Choreography as the dynamic expression of the composition, gives sense to carrying out the exercise'. Consequently, coaches spend much time pondering how to choreograph a routine that will be successful, of high artistic quality, and fulfill the demands of the Aerobic Gymnastics Code of Points 2009-2012.

The choreography of a composition is judged from four different viewpoints: (1) the dynamism and fluency level of the movements, (2) the complexity level of these movements (except for AMP and difficulty elements), (3) the selection of the movements such that they show variety and creativity (except for AMP and difficulty elements), and (4) the effective use of the competition space and the placement of all movements in the length of the routine (Code of Points 2009-2012). Each of the four viewpoints is given 1 point. In the judging of (2) and (3), only transitions and linking are taken into account.

Transitions is "the passage from one form, state, style, or place to another and connect two themes or sections of the routine, allowing the performer to change level (floor-surface-airborne)" (Aerobic Gymnastics Code of Points 2009-2012). Transitions allow athletes to not only utilize the three levels of competition space effectively and maximally, but also serve to connect movements in a smooth and natural manner. Thus, transitions play an important role in a routine and good transitions are a critical aspect of the artistic component of an individual routine.

Top-class athletes have little problem perfectly performing basic technique skills such as arm movements and steps, despite the diversity and complexity of the changes required. However, the necessity for utilizing highly aerobic movements often confines athletes to one plane (standing) for the majority of a routine. This confinement negatively affects the aesthetics of movement and the visual impact. Additionally, top-class athletes often use similar difficulty elements, particularly those from the jumping group to produce spatial variation.

Often very similar difficulty elements are performed in the routines of different athletes. This makes the transitions a very critical aspect of the choreography with spatial change. The Code of Points requires transitions to be complex, novel, innovative and diverse. However, while most people have an idea of what these descriptors mean, without further detail they are too vague and abstract to be of use for most coaches, especially those new to the field. How, then, should transitions be described in order to be of use for a coach in the production of successful performers?

The Aerobic Gymnastics World Championship is the top event in this field. MATOS LOPEZ Marcela from Brazil won the championship in the 11th Aerobic Gymnastics World Championship in 2010 (Rodez, France), with an artistic score of 9.250. This was the highest artistic score ever achieved in the individual category. Expert international judges gave high evaluations of the transitions of her routine (personal communication with the international judges). Therefore, it would be valuable for coaches and athletes to know why her routine won such great praise and how she attained such a high artistic score. The purpose of this study is to answer this question.

We analyzed the choreography of the champion with special attention to the timing, orientation and flow of the transitions in her routine. For a comparison, we also analyzed the performance of the athlete who ranked eighth and obtained the lowest artistic score in the final of the same championship. It is our hope that the knowledge provided from this analysis will benefit coaches not only in broadening the layout of ideas in their choreography but also in furthering the construction of an optimal training program.

Methods

A video analysis of the transitions component was made for the two routines performed by the Champion and the eighth ranked player in the final of the 11th

Aerobic Gymnastics 2010 World Championships in Rodez, France. These routines were recorded by national team of the Republic of China at the game site. Video images at a frame rate of 30Hz were taken of the routines from the warning tone before at the start until the warning tone at the end of the routines. Adobe Premiere Pro CS5 was used to calculate motion path as well as the duration of each transition.

The transitions in a choreographed routine normally have two forms, each with a different purpose. One form is termed ‘Characteristic Transition (CT), and contains a definite start and end. The major goal of this form is to act as an independent component. For this study, the other has been termed a ‘Mini-Transition (MT)’, and functions as a foreshadowing. It can be subdivided into three types (jump, upward and downward), and establishes suitable conditions for performing subsequent movements smoothly.

Three aspects of the transitions were analyzed in this study: 1) duration and times, 2) movement patterns and pivots/ supporting parts, and 3) trajectory and location.

The first aspect provided a quantitative description of the “intensity” of the transitions. Trajectory was defined as the path shape of the transition and the location represented within the zone in which transitions were performed. In international meets the competition area is a 7m X 7m square. In order to describe the position where transitions were performed, the area was divided into nine zones, as shown in Figs 3 and 4. For calculating the percentage of usage of zones for transitions, we counted the times that each performer used a particular zone to execute transitions, which was then divided by the total times of counts.

Results

The length of the routine and the total time used in transitions for the champion were 1’31 sec and 16.2 sec. For the eighth ranked player, the times were 1’32 sec and 16.1 sec. Both players performed transitions with similar percentages of each routine (17.8% for the champion and 17.6% for the eighth ranked player).

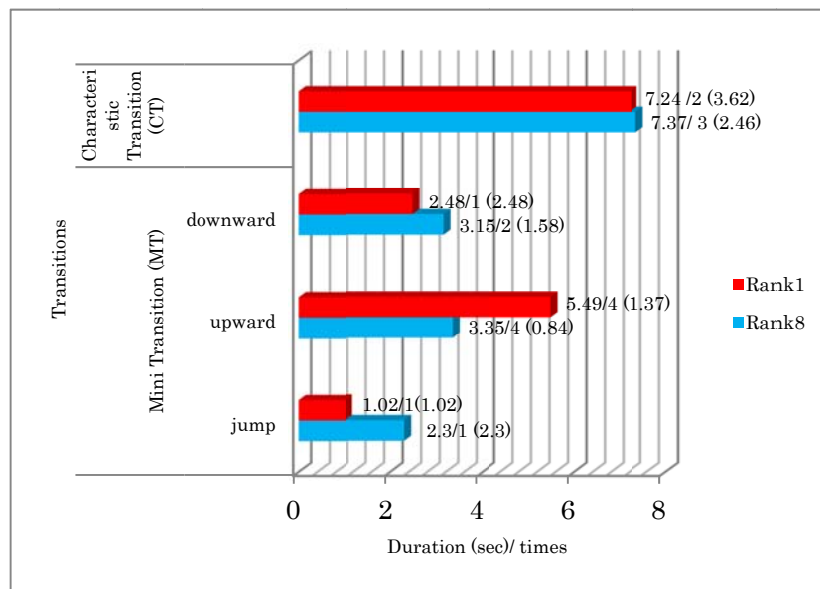


Fig 1. The duration, the amount of times and mean duration (shown in parenthesis) for each string of every type involved in characteristic transition and mini transition for the two players.

Fig1 shows the duration and the amount of times involved in each type of transition. The two players spent

similar total time for the CT. For the MT, the champion took more time on the upward MT, while the eighth

ranked player utilized twice as much time for the jump MT. The downward MT was choreographed a little longer as well. However, except for the jump MT, the

champion took a longer time for performing one string of transitions than did the eighth ranked player (parentheses' in Fig.1).

Table 1. The movement pattern of transition, the degrees of transitions revolved round the axis, and the body parts that worked as the pivot to complete movement of transitions

CT	Form	Movement Pattern	Pivot/Supporting Point
Rank 1	B-A-B	Cossack roll(V+S+F.1/2Turn)-Front Support(V.1/3Turn)	Hand/hands
	B-A-B	Forward roll(F.1Turn)-turn over(V.1/2Turn)-elbow supporting(V+S.1Turn) twist-Capoeira(S.1/4Turn)	Back/forefoot/forearm/hand
Rank 8	B-C-B-C-B	Jump Knee Lift Jump-Alternate Knee Lift Jump	One Foot
	B-C-B-C-B	Jump(V.1Turn)-JumpV.1Turn)	One Foot
	B-C-A	Jump- Forward Roll(F.1Turn)	Feet-Hands-Back-Hip

(Space A is floor, Space B is standing, and Space C is airborne; V-vertical axis, S- sagittal axis, F- frontal axis)

Table 2. The Movement pattern of mini-transition and the pivot of body parts to complete movement of transitions

MT	Form	Rank 1		Rank 8	
		Movement Pattern	Pivot	Movement Pattern	Pivot/Supporting Point
Downward	B-A			Backward Roll(F.1Turn)	Back-Shoulder-Hip
	B-C-A	Knee lift Jump (V.1/2Turn)	Feet-Hand	Jump(S.1/4Turn)-Front Support(S+F.1/2Turn)	Feet-Hands-Hip
Upward	A-B	Cartwheel(S.1/2Turn)-Backward roll(F.1Turn)	Hands-Back-Shoulder-Feet	Recovery	Feet-Hands
	A-B	Turn round(V.3/4Turn)	Hands-Feet	Recovery	One Foot
	A-B	Turn round(V.4/5Turn)	Hands-Knee	Helicopter	Hands-One Foot
	A-B	Turn over(V.3/4Turn)	Hands-Knee	Turn round (V.1/2Turn+F.1/2Turn)	Forearm-Shoulder-Hands
Jump	B-C-B	Knee Lift Jump	One Foot	Leg curl Jump	One Foot

(Space A is floor, Space B is standing, and Space C is airborne; V-vertical axis, S- sagittal axis, F- frontal axis)

In Table 1 and 2, the forms and movement patterns of the transitions and their pivots for the two players are shown. In the CT section, the two players chose different forms (Table 1). The champion focused on the usage of floor (A) and standing (B), while the eighth ranked player highlighted changes from standing to airborne (C).

In the CT of the champion, all six movement patterns differed from each other, and many variations could be also observed in movements, degrees of rotation, rotation axis and pivot or supporting points. Notably, compound axes (V+S+F and V+S in Table 1) were choreographed in each string in a different way. The eighth ranked player, on the other hand, performed jumps 5 times. The first string had two movements from the same family. The first two strings were performed with the same pivot.

The champion used two strings of CT composed of distinct numbers of movements (2:4). However, the eighth ranked player used six movements in three CTs, each having the same number of movements (2:2:2).

As for subcategories of MT, the eighth ranked player used downward movements with changes in pattern, method and pivots more than the champion did (Table 2). For upward movements, the two players used the same forms (A-B in Table 2). The champion's performance utilized changes in pattern or method, while the eighth ranked player utilized pattern 'recovery' twice in the same way. The two players performed the jump once, which was similar in various properties, except for the name of the jump.

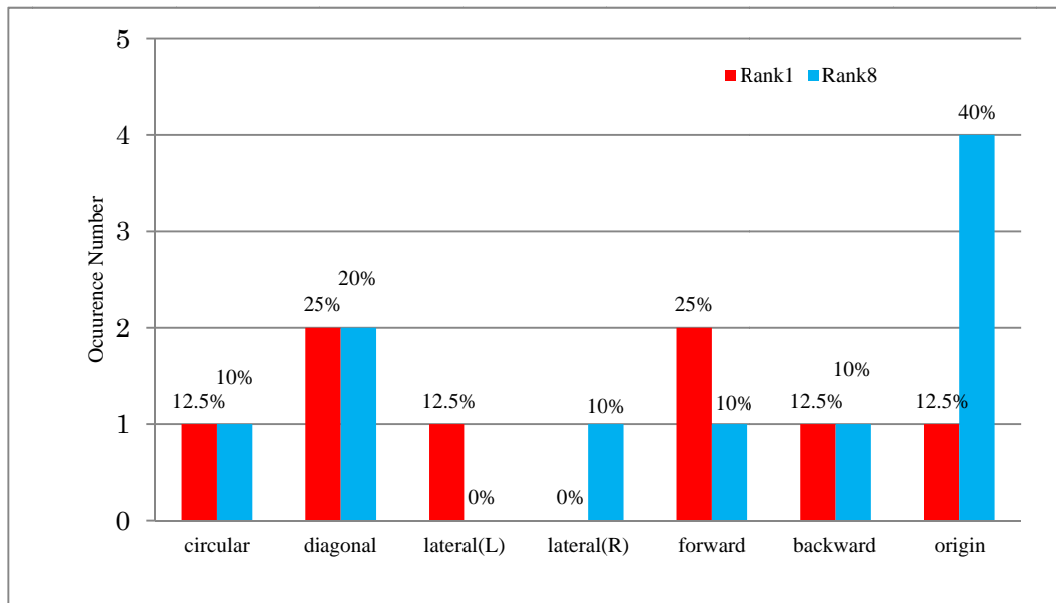


Fig 2. The occurrence number and percentage of different trajectories (circular, diagonal, straight line and origin) and directions (lateral left/right, forward and backward) for the two routines.

Figure 2 shows the number and percentage of different trajectories and directions. Note that in the choreography used by the champion all the trajectories occurred with a balanced distribution, once or twice, with the exception of the lateral right direction. On the other hand, the eighth

ranked player performed 40% of the transitions in the same place, and she did not use a movement in the lateral left direction. All the circular, diagonal and backward trajectories seemed to be choreographed in a consistent manner.

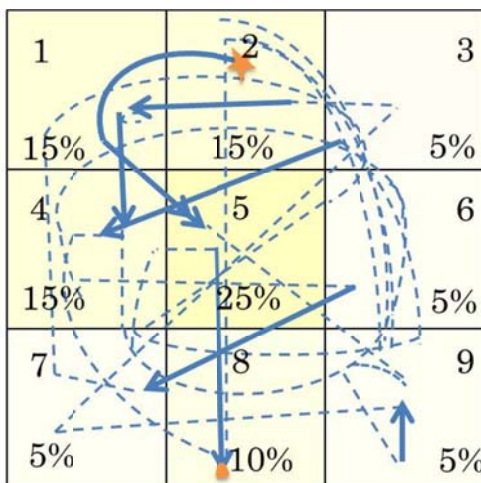


Fig 3. The whole trajectory of competition's routine. The competition area is divided into the nine zones. Bolds are the trajectories of transitions and the broken lines are the AMP and difficulty elements. The percentages are the location for the transitions performed. The pentagram is the starting point, and triangle marks the end point.

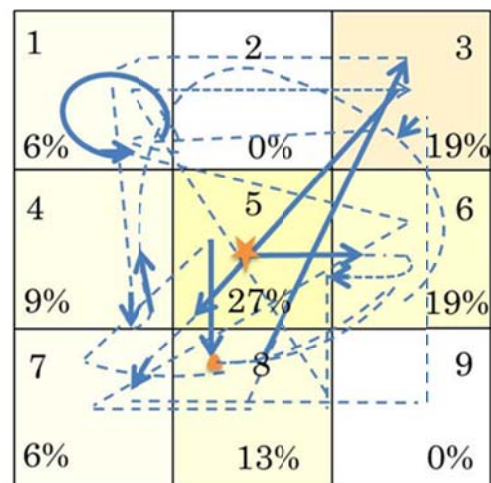


Fig 4. The whole trajectory of eighth ranked player's routine. The competition area is divided into the nine zones. Bolds are the trajectories of transitions and the broken lines are the AMP and difficulty elements. The percentages are the location for the transitions performed. The pentagram is the starting point, and triangle marks the end point.

In the champion's routine, transitions were choreographed to include all zones, and most transitions involved the crossing of at least two zones. Furthermore,

even for the same shape of trajectory, such as diagonal, the transitions were completed utilizing a different length and in different places. The eighth ranked player, on the

other hand, completed nearly half of the transitions at the same position (short arrows in Fig.4), and only one trajectory traveled more than two zones. The zones at the top center and bottom right were not used at all.

Discussion

The aim of this study was to describe the characteristics of the choreography in the Aerobic Gymnastics routine that was performed by a world champion who achieved the highest artistic point total in history for the category of Individual Women. As a comparison we also analyzed the routine of a player who placed eighth in the same event.

Choreography of CT in the Champion's routine gave an impression of richness and variety, regardless of the forms and the pivots, or the complexity of the movements. In particular, a string was composed of four movements from different families, with different pivots and rotation axes (Table 1). Movements performed at one place are seen as at a 'point', whereas the flow can be regarded as a dynamic 'line'. Point to point, line to line, point to line or line to point together with change of orientation can convert even a simple movement into a sequence that is diverse, full of vitality, and will have great appeal to audiences. In this regard, the eighth ranked player performed a simple movement in CT, which was the only original part (forward roll) in her routine. The remaining portions were completed from small changes in jump combinations. As the Code of Points of Aerobic Gymnastics notes, 'to evaluate the variety of the routines, the artistic judges will take it into consideration that all movements must be performed without repetition and reiteration of the same type of movements.' Therefore, repetitions and reiteration are taboos in the choreography of Aerobic Gymnastics. In fact, transitions are a part of the routine, and as such should have an independent expression. As such, the CT should be choreographed in a dynamic manner and include change in CT as many elements as possible. The performance of similar

movements many times, in a short time span, with small changes should be avoided.

Although the two routines analyzed in the present study were similar in the proportion of transition arrangements, the eighth ranked player's choreography was more monotonous. Movements of the same family (jump) were repeated in CT and MT, which is suboptimal according to the rule that emphasizes the use of diversity and originality. The jump resonates more with the audience, but repeating jumps with an identical plane or direction is often counterproductive. It would be better to choreograph jumps that have a change in the rotation axis, or even possibly with multiple-axis changes, like the butterfly twists found in martial arts.

Even though the champion's MT appeared to use the same form of upward movements, like the turn around and turn over (Table 2), these MTs were completed either in different directions, degrees or track length. In this regard, the eighth place performance was more monotonous, using 'recovery' twice with the same degree of spin and in the same direction. Perhaps the strategy of the champion involved performing difficulty element with a spatial change instead of an ordinary downward MT in order to demonstrate how change from the standing space to the floor can be accomplished. Of course, difficulty element requires a high level of physical ability, which might limit the choreography's complexity for some players. In this case it might be a good idea to improve the choreography by changing the various parts of the total movement.

Two players used almost the same body parts to pivot, and avoided using the common support hands and feet. Instead they used the forearm, shoulder and knee. Perhaps, they could have been even more innovative in the choreography and used such structures as the chest, abdomen, and hips. These could have potentially have been taken as an entry point in the choreography.

Choreography of the trajectories and locations needs to balance use of the seven different shapes and the nine

different zones. The routine of the champion was rich in complex circle and diagonal movements that were performed in different zones and completed with different route lengths. On the other hand, in the routine of the eighth ranked player, the route layout looked rigid.

The choreography of transitions requires high levels of imagination. If just one element in a movement is changed, such as the form of the transition, the distance of performing it or the orientation, the movement could easily become less exciting. However, it might be made more attractive if several elements were put in superposition states. Indeed, the champion always performed transitions by not only using a variety of complex movements, but also by continuously utilizing different length and combinations of location and orientation of the supporting parts. This produced a strong visual impact on the audience.

According to the code of points in Aerobic Gymnastics, 'the effective use of the competition space and the placement of all these movements in the length of the routine' are important element. For transitions, the movements have to cover all the zones of the competition area, without overusing particular zones. The two routines seldom employed the lateral trajectory; perhaps the choreographers only were concerned that the layout of AMP and difficulty element be balanced in the competitive area. This resulted in some transitions being overlooked and thus probably performed less in several of the zones. For the eighth ranked player two zones were not used at all. Since the circle and the diagonal shapes are more complex and rich in change as compared with lateral and anterior-posterior transitions, they should be emphasized in the choreography. However, this requires players of good abilities in physical strength and flexibility. Therefore, coaches should pay more attention to physical training regimes in order to improve the specific coordination and physical strength of the players.

A good choreography should be performed at constant "intensity", meaning that every component of routine was played with a large amount of energy and passion in every component of routine. Even transitions are required to exhibit originality and emotions that are consistent with other components. If most transitions are choreographed at a low intensity, the performance will not be passionate enough. The champion's transitions were full of intensity and they could thus be regarded as "independent components" just like AMP and difficulty elements.

Based on the present results, we conclude that (1) The champion's transitions were choreographed with high intensity, diversity and complexity, and with excellent balance for the types of trajectory and usage of all zones within the competition area, and (2) the champion's CT was choreographed such that evaluated as an independent component it contained rich content. A useful summary of choreography would be that it requires complexity with change in every possible part and must occur within a limited space in the least time. All these factors should be based on the extent to which the players are physically able to accomplish them. However, the principles of training the type of coordination needed in this sport are somewhat unclear. Is it sufficient to repeat a task so many times that it becomes automatic and unconscious an aid in developing an overall coordination? We have described the motions required in the transitions portion of aerobic gymnastics, but specific suggestions for training protocols must await further study.

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