Giornale Italiano di Educazione alla Salute, Sport e Didattica Inclusiva / Italian Journal of Health Education, Sports and Inclusive Didactics - Anno 6 n. 1- ISSN 2532-3296 ISBN 978-88-6022-436-1 - gennaio - marzo 2022 - CC BY-NC-ND 3.0 IT- https://doi.org/10.32043/gsd.v6i1.510

A CONSTRAINTS-LED APPROACH FOR SKILL ACQUISITION IN TRIALS

UN APPROCCIO GUIDATO DAI VINCOLI PER L'ACQUISIZIONE DELL'ABILITÀ NEL TRIALS

Daniele Albano
University of Salerno
dalbano@unisa.it

Benedetta Romano
University of Salerno
bromano@unisa.it

Rodolfo Vastola
University of Salerno
rvastola@unisa.it

Abstract

Trials is a specialty of off-road cycling that requires the athlete to overcome obstacle courses with special bicycles. The technical component is of fundamental importance and several hours of practice are required to acquire even the basics. To date, however, there are no theoretical references for teaching this discipline and the method adopted is mainly based on breaking down what is considered the technical reference model into simpler sub-components and its continuous repetition. In this work, Trials is framed within the framework offered by ecological dynamics and nonlinear pedagogy, through a constraints-led approach for skills acquisition. The aim is to provide examples of specific constraints related to this discipline and possible practical applications for the acquisition and development of skills in Trials.

Il Trials è una specialità del ciclismo fuoristrada che richiede all'atleta di superare percorsi ad ostacoli con biciclette speciali. La componente tecnica è di fondamentale importanza e sono necessarie diverse ore di pratica per acquisire le basi. Ad oggi, tuttavia, non esistono riferimenti teorici per l'insegnamento di questa disciplina e il metodo adottato si basa principalmente sulla scomposizione di quello che viene considerato il modello tecnico di riferimento in sottocomponenti più semplici e sulla sua ripetizione continua. In questo lavoro, il Trials è inquadrato all'interno della cornice offerta dalla teoria dinamica ecologica e dalla pedagogia non lineare, in particolare attraverso un approccio guidato dai vincoli per l'acquisizione delle abilità. L'obiettivo è fornire esempi di vincoli specifici relativi a questa disciplina e possibili applicazioni pratiche per l'acquisizione e lo sviluppo dell'abilità nel Trials.

Key-words

Trials, skill, constraint, ecological dynamics, affordance, nonlinear.
Trials, abilità, dinamica ecologica, affordance, nonlineare.

Introduction

Trials is a specialty of off-road cycling that requires the athlete to overcome obstacle courses with special bicycles without setting foot on the ground (UCI, 2021). Among cycling specialties, Trials is probably the most complex from a technical point of view. Practicing Trials require far more complex skills than simple pedalling and requires several hours of practice

even to learn basic moves. Currently the only reference on technique is a manual approved by the UCI which describes the different techniques (Happich, 2013). However, there is no reference to didactic strategies to teach them and as far as we know, by direct experience in the field, the current teaching methodology is based on an instructive coach-centred approach. The technique is decomposed into simpler sub-components learned on their own and then reassembled with the intention of finally realizing the predetermined technique. There is little evidence to support this way of teaching, indeed this has been criticized by more recent research (Davids et al., 2013; Tan et al., 2012; Renshaw et al., 2010).
Ecological dynamics theory offers an interesting point of view with respect to the teaching-learning of sports technique and motor skills. According to this theory, the learner is a complex dynamic system and learning is a non-linear process (Renshaw et al., 2009), strongly influenced by the context (environment) that provides a great variety of information (affordances). The learner perceives information and acts accordingly in a circular process called perception-action coupling, then by self-organization processes reaches the effective movement solution (learning motor skills). From the ecological dynamics theory (Woods et al., 2020) and non-linear pedagogy (Correia et al., 2019) was born the Constraints-led Approach (CLA) in which motor learning is determined by the interaction of three types of constraints: organism, environment, and task (Davids et al., 2008). Through the manipulation of one or more of these constraints it is possible to improve the perception-action coupling and by guiding the individual self-organizing process, to reach a more effective movement solution (Araujo et al., 2006). The organismic constraints refer to the physiological, psychological, and experiential aspects of the individual, such as genetic factors, height, weight, emotions, motivation, feelings, learning and previous experiences. The environmental constraints refer to both physical properties, such as light and temperature, and sociocultural characteristics, such as beliefs and values. The task constraints are the most specific and closely linked to a certain sport, these include the aims, the rules, the equipment, the sports facilities, the playing field (Davids et al., 2008). Constraints could be used to de-stabilize non-optimal movement solutions, to encourage exploration of new solutions and self-organization, to amplify information and invite specific affordances, also, constraints can provide feedback about the effectiveness of the search for an optimal solution (Gray, 2021).

Aim of the study

The aim is to identify specific constraints in Trials with options to manipulate them in practice. In addition, an example of CLA application in this sport is given.

1. Specific Trials constraints

An analysis of the discipline was carried out for each category of constraint to identify specific ones. The analysis was conducted based on knowledge relating to Trials gained on the field and by research (Albano et al., 2019; 2020; Vastola et al., 2016; 2017).
Once specific types of constraints relating to Trials were identified, various options for modification for practice have been proposed (table 1).

Constraint	Specific type	Options
Task	Instruction	Technique, attentional focus, feedback
	Safety demands	Minder, safety mats
	Preview/Practice	With or without preview of the section, with or without practice the section
	Expectations	Known or unknown sections
	Specialised equipment	Helmet, gloves, shoes, bike
	Rules	Penalties based or score based
	Spatial and temporal limitations	With or without surface boundary, with or without time limit
	Approach to the obstacle	By front, by side, up a slope, down a slope, on a high or low floor, wide/narrow surface, flat/sloped
	Obstacles	Heigth, width, gap between obstacles, incline
Environment	Section surface properties	Concrete, wood, metal, rocks, tyres; rough/smooth, wet/dry, rigid/elastic, hard/soft, even/uneven
	Weather	Indoor/outdoor, sunny, windy, rainy, hot, cold, wet, daytime (natural lights), nighttime (artificial lights)
	People	Spectators, friends, parents, coach, teammates
Individual	Psychological	Focus, self knowledge, fear and anxiety management, resilience, arousal-control, risk-taking
	Ability level	Beginner, intermidiate, elite
	Anthropometric, physiological, developmental factors	Height, weight, BMI, strength, sex, age, coordination
	Developmental experiences	Movement previuos experiences

Table 1. Specific Trials constraints with options.

2. An example of CLA application in Trials: the roll-up

The roll-up is one of the front climbing techniques that are taught first, it is the easiest way to get on an obstacle using a little run-up.

Figure 1. The roll-up technique. Source: Happich (2013).

From a motor learning point of view, the problems that the learner faces are lifting the front wheel over the edge of the obstacle, shifting the weight forward, letting the bicycle roll over the obstacle by making a round movement. Also, there is the fear of hitting the edge of the obstacle with the front wheel and crashing into it. Having outlined the movement problems in this specific case, it is necessary to prepare a learning environment, by manipulating specific constraints, to allow the learner to find an effective solution.
In this example, a modification is proposed relating to the task constraints, specifically with respect to the shape and size of the obstacle. First, the obstacle must have an adequate height

for the athlete's skill level and a rounded shape (figure 2 – a), such as to avoid the fear of hitting it, caused by an obstacle that has an edge. The rounded shape of the obstacle affords a round action, which is the desired one, and avoids the abrupt interruption of the movement if the action of shifting the weight forward is not optimal. Once the basic components of the movement have been acquired, the height of the obstacle can be increased, and the shape further modified to bring it closer to a squared one, but with a rounded edge (figure 2 – b). Finally, when the athlete performs the movement safely, it is possible to switch to the squared shape (figure 2 - c).

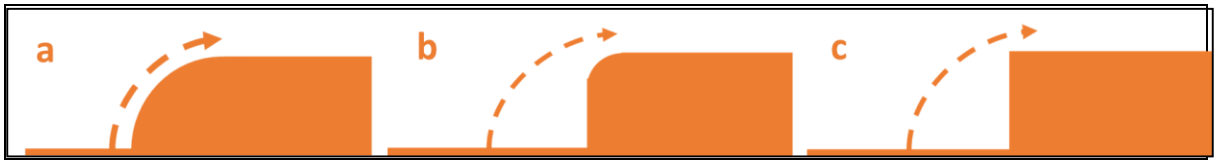

Figure 2. Obstacle modifications: (a) rounded obstacle, (b) rounded edge obstacle, (c) squared edge obstacle.

3. Discussion

In CLA the teaching strategy passes from the task decomposition to the task simplification. The relationship between perception and action, extremely important in ecological dynamics, is completely altered in task decomposition, on the contrary by simplifying it, the structure of the movement, the information from the environment and the intention (the purpose) remain intact. The role of the coach in CLA is the designer of the environment, but also, he may provide feedback and informational constraints. In the example shown, a change was made to the task constraints, changing the shape of the obstacle. This was done to invite a round movement and avoid the fear of hitting the edge of the obstacle. The round shape of the obstacle should facilitate the approach and rolling over, making the execution of the movement easier and the practice more successful. It is noteworthy that in the practice of Trials obstacles do not always have a regular shape, therefore, it is necessary to maintain a certain variability with respect to the nature of the obstacles used during training. This way of proceeding, creating the conditions for finding effective movement solutions, allows the athlete to exploit his self-organization skills, to learn to grasp useful information from the environment and to be more successful during learning.

Conclusions

Given the importance of technique in Trials and the initial learning difficulty, find a way to facilitate skill acquisition, increasing the success rate, could help a greater diffusion of this sport, which although spectacular, remains not very popular. The result obtained in this study, albeit theoretical, by identifying the specific constraints in Trials and by describing manipulation options and by showing possible applications, represents the first step for subsequent research, with a series of experiments aimed at evaluating the effectiveness of this approach.

References

Albano, D., Astone, S., Coppola, S., & Vastola, R. (2020). Muscle control of the ankle joint in mountain bike trials. *Journal of Physical Education & Sport*, 20. DOI:10.7752/jpes.2020.s6419

Albano, D., Coppola, S., & Vastola, R. (2019). Vertical jump performance in Italian elite Trials athletes. *Journal of physical Education and Sport*, 19, 2110-2114. DOI:10.7752/jpes.2019.s6316

Araujo, D., Davids, K., & Hristovski, R. (2006). The ecological dynamics of decision making in sport. *Psychology of sport and exercise*, 7(6), 653-676. DOI:10.1016/j.psychsport.2006.07.002

Correia, V., Carvalho, J., Araújo, D., Pereira, E., & Davids, K. (2019). Principles of nonlinear pedagogy in sport practice. *Physical Education and Sport Pedagogy*, 24(2), 117-132. DOI: 10.1080/17408989.2018.1552673

Davids, K., Araújo, D., Vilar, L., Renshaw, I., & Pinder, R. (2013). An ecological dynamics approach to skill acquisition: Implications for development of talent in sport. *Talent Development and Excellence*, 5(1), 21-34. https://eprints.qut.edu.au/219712/

Davids, K., Button, C., & Bennett, S. (2008). *Dynamics of skill acquisition: A constraints-led approach*. Human Kinetics.

Gray, R. (2021). *How We Learn to Move: A Revolution in the Way We Coach & Practice Sports Skills.* Independently published.

Happich, J. (2013). *Your Complete Guide to Trials Riding: all you need to know step-by-step.* Wild Grip.

Renshaw, I., Davids, K., Shuttleworth, R., & Chow, J. (2009). Insights from ecological psychology and dynamical systems theory can underpin a philosophy of coaching. *International Journal of Sport Psychology*, 40(4), 580-602. https://eprints.qut.edu.au/29406/

Renshaw, I., Chow, J. Y., Davids, K., & Hammond, J. (2010). A constraints-led perspective to understanding skill acquisition and game play: a basis for integration of motor learning theory and physical education praxis?. *Physical Education and Sport Pedagogy*, 15(2), 117-137. DOI: 10.1080/17408980902791586

Tan, C. W. K., Chow, J. Y., & Davids, K. (2012). 'How does TGfU work?': examining the relationship between learning design in TGfU and a nonlinear pedagogy. *Physical education and sport pedagogy*, 17(4), 331-348. DOI: 10.1080/17408989.2011.582486

UCI (2021). *Regulations, "Part VII, Trials"*. Union Cycliste Internationale.

Vastola, R., Coppola, S., Daniele, A., & D'Elia, F. (2017). Video Analysis of Side Hop Technique in Trials. *Journal of Sports Science*, 5, 58-63. DOI: 10.17265/2332-7839/2017.01.006

Vastola, R., Medved, V., Albano, D., Coppola, S., & Sibilio, M. (2016). Use of optoelectronic systems for the analysis of technique in Trials. *Journal of Sports Science*, 4(5), 293-9. DOI: 10.17265/2332-7839/2016.05.006

Woods, C. T., McKeown, I., Rothwell, M., Araújo, D., Robertson, S., & Davids, K. (2020). Sport practitioners as sport ecology designers: how ecological dynamics has progressively changed perceptions of skill "acquisition" in the sporting habitat. *Frontiers in Psychology*, 11, 654. DOI: 10.3389/fpsyg.2020.00654