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Applying a Visualization Tool to Build Desirable Difficulty in Training Activities

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By Kyle Leppert and
Claire Adkinson



Whether we speak in terms of “progressive overload” (Haff & Triplett, 2016, p. 99) or “zones of proximal development” (Ambrose et al., 2010, p. 132), acquiring skills requires athletes to experience challenges just beyond their current level of ability. An overreach in the challenge can cause frustration, bad habits, or injury in training, while inadequate challenge can cause boredom, or a lack of preparedness for the conditions presented by competition. “Desirable difficulty”—an exercise difficult enough to generate cognitive work but not impossible, in which success is consistent but not constant—is the ultimate goal for coaches to facilitate athletes’ development (Lemov, 2020, p. 35).

A visualization tool adapted from rehabilitation exercise therapy is presented as a means for coaches to organize and select activities to progress or regress the difficulty of a skill to match the needs and abilities of their athletes. This article provides examples of using this visualization practice to organize skill chunking and sequencing in developing skills, with examples from lacrosse.

Chunking

Chunking, or creating small, discrete portions of information for players to learn piece by piece, can help ensure that players better organize, and thus retain, new information. Coaches make it easier for players to digest and organize the information when they identify the chunks into which a skill can be broken down and practiced (Gilbert, 2017). Teaching complete skills often involves developing athletes’ proficiency through a series of skill chunks—simple at first and then progressively more complex. Chunking serves to separate the steps of the sequence, which can be rehearsed in isolation, such

as practicing sprint starts separate from the remainder of the race or “dodging” to get past a defender separate from shooting. In team sports like lacrosse, players on offense must pass, catch, dodge, shoot, and recognize the right time to do each. Coaches commonly create segments of practice to work on shooting and passing in isolation and see players succeed at a high rate, only to become frustrated later in the same practice when a period of live play contains many errors in these same basic skills.

Experienced coaches, throughout their careers, accumulate options for adjusting the challenge of their drills and training activities. They can adjust on the fly for differences in the level of skill, fitness, or specific learning needs they perceive in the athletes participating. These adjustments consist of progressions (increases) or regressions (decreases) to the challenge of an activity. Novice coaches who may not have amassed the same volume of experience can easily find texts, videos, and blogs on progression/regression options, but they may struggle to apply them effectively until they can discern which elements of an activity can be added or removed to adjust difficulty versus those that are essential to the training objectives (i.e., the central goal of learning). This skill is important for sports coaches, practitioners of strength and conditioning, and rehabilitation specialists, all of whom share a common aim: to find, adapt, or create exercises of desirable difficulty to optimize learning and training.

Building Progressions

Blanchard and Glasgow (2014) designed a visual model for rehabilitation therapists who develop exercise programs to apply and communicate their exercise progression plans (Figure 1). The

A = Key focus, goal of this activity

- Task/challenge introduced
- Focus/cues to introduce

B = Additional focus, goal of activity

- New task/challenge introduced
- New focus/cues to introduce

C = Additional focus, goal of activity

- New task/challenge introduced
- New focus/cues to introduce

D = Additional focus, goal of activity

- New task/challenge introduced
- New focus/cues to introduce

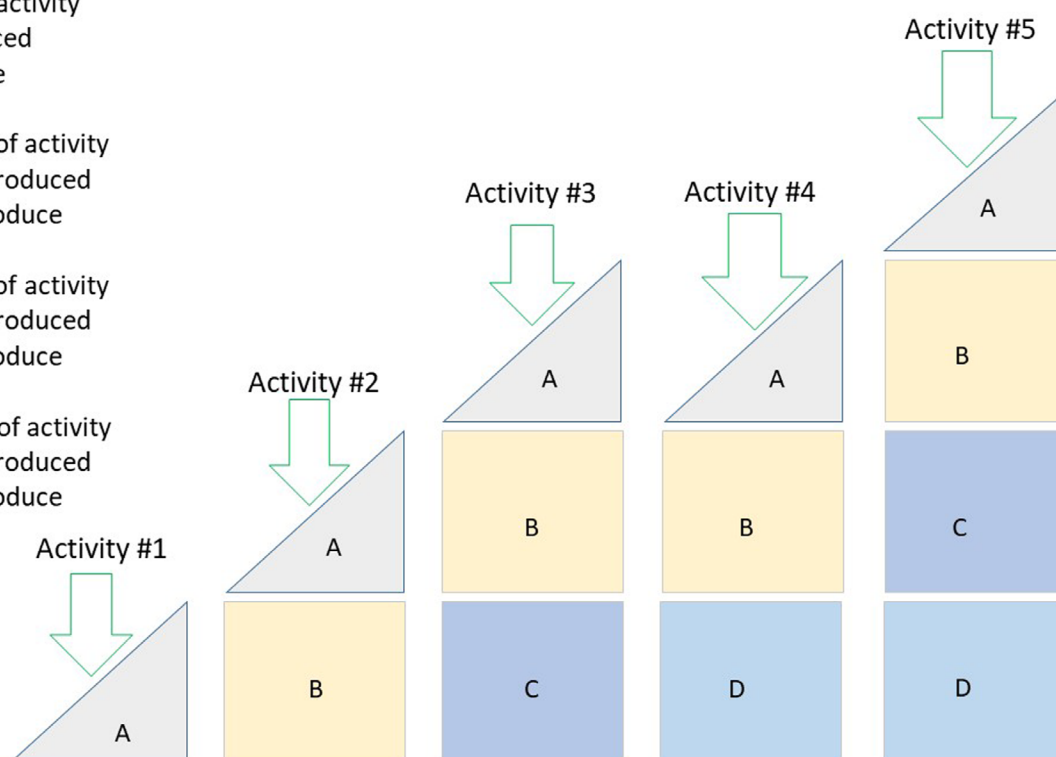


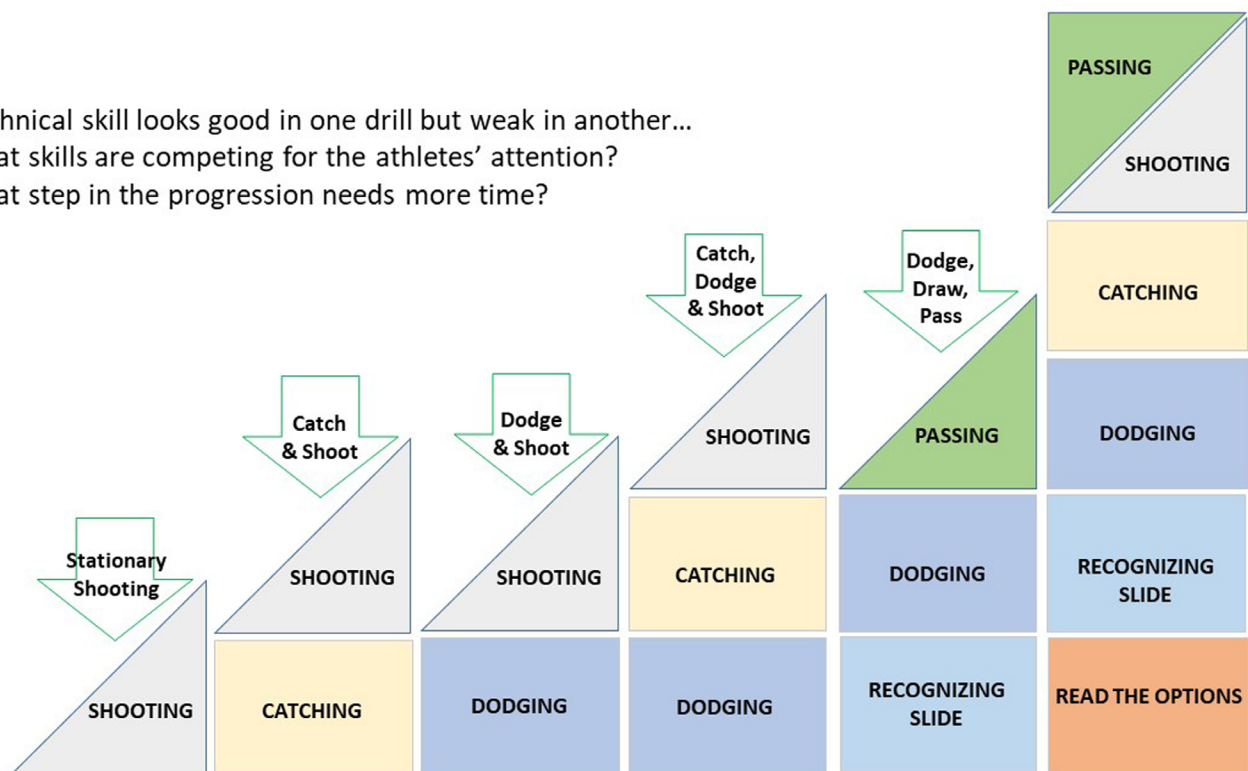
Figure 1. Adaptation of Blanchard and Glasgow’s (2014) theoretical model for exercise progression.

As a coach progresses the activity from left to right on [Figure 1](#), they can expect an initial increase in errors as players gain experience and refine their practice. However, they have a better chance of keeping errors in appropriate balance with successful attempts to keep players motivated. When the proportion of errors is too significant, and the coach feels players are becoming frustrated or developing bad habits, the visualization practice encourages them to consider which chunks are most in need of work versus which should perhaps be removed for a time to reward players for correct actions.

preparing for live play requires athletes to build awareness of more information in their surroundings and tune out irrelevant information from a busier, more quickly changing scenario. This may work best in lacrosse and similar team sports by focusing on one-on-one offensive and defensive responsibilities and decision making before incorporating additional off-ball players. Figure 3 presents a sequence in which the coach begins by focusing on the responsibilities of a single offensive with the ball (“O”) and defensive (“D”) player through live 1-on-1 play. The offensive player can focus on dodging to gain an opportunity to shoot while the defender focuses on taking the steps to force the opponent away from shooting range.

If a technical skill looks good in one drill but weak in another...

- What skills are competing for the athletes' attention?
- What step in the progression needs more time?



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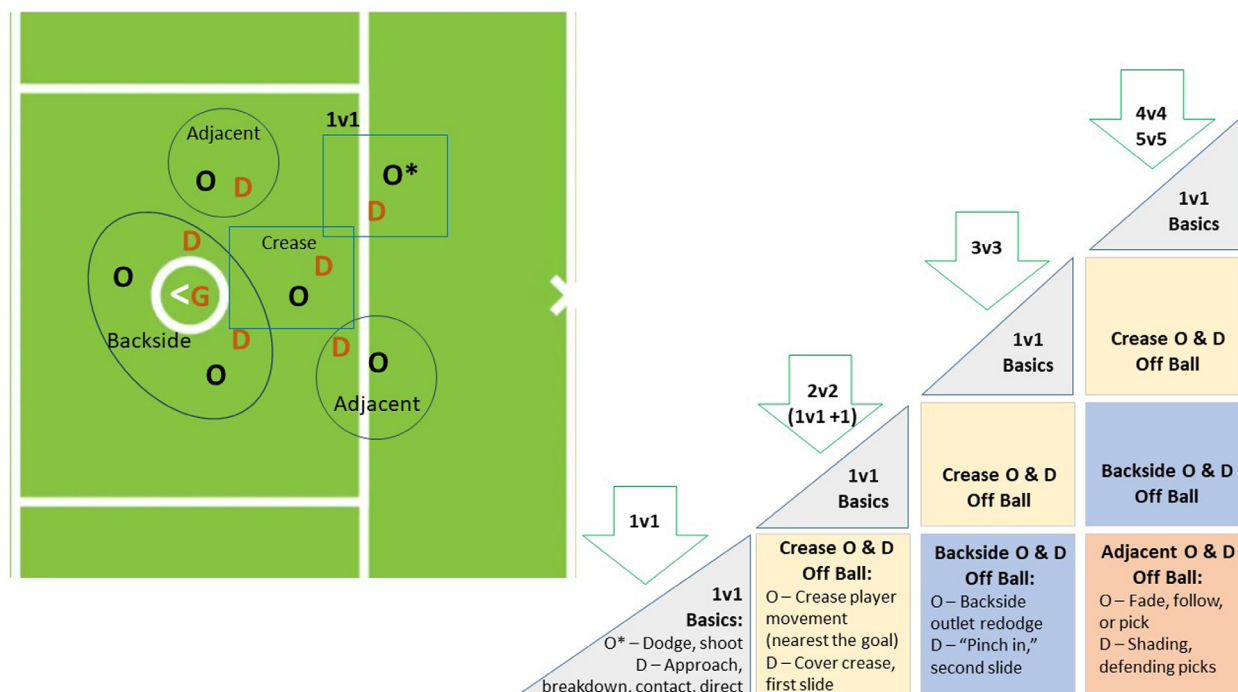


Figure 3. A progression of small-sided play in lacrosse by adding players in typical roles of full offense versus defense in the half field (i.e., settled 6 versus 6).

Note. O = offense (O* = Ball Carrier), D = defense, G = Goalie.

Each of these roles, relative to the position of the ball in possession, requires different techniques, tactics, and decision making of the players, and ultimately players' roles will quickly change with each pass of the ball from one player to another during live play. Initially reducing, then gradually building, the number of roles involved through the use of small-sided play scenarios allows players to focus on the key coaching points of each with more consistent repetitions and feedback.

Summary

Journals, newsletters, YouTube channels, and social media provide coaches with a vast trove of activities for developing skills; however, each coach must be able to adjust the difficulty to match the unique needs and abilities of their athletes. Visualizing the process of adjusting difficulty through chunking and progression/regression may ease the burden on coaches to find, create, or adapt training activities. Creating visual models gives coaches a means to more easily communicate with assistants or others about the skill chunking and sequencing they utilize in training.

Visual diagrams like the ones shown here also help clarify principles of progression/regression in coach education settings where the level of sports expertise of coaches in the room may vary, and can reduce confusion related to progression methods in other sports (e.g., undergraduate coaching courses, recreational sports organizations). Working through the chunking (i.e., A+B...) approach can help effectively modify drills found at other levels in the same sport (e.g., from college to high school level), it can enable a coach to customize a task or instruction for athletes of different skill levels within the same group, and it can help a coach to more effectively innovate and create drills to

address skill components by removing chunks and then reintroducing them as the athletes gain consistency. Most importantly, however, diagramming the logic of these adjustments in a visual framework can help more coaches to share their great ideas with others to benefit their teams, organization, or sport as a whole.

Disclosure Statement

No potential conflict of interest was reported by the author(s).

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