

Skill Acquisition in Boccia



Prepared by:

Dr Ross Pinder

Skill Acquisition Specialist

Australian Paralympic Committee

Funded by: 

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Pre-reading

Basic introduction to coaching: <http://www.boccia.com.au/about/CoachingMaterial/>

Outline

This document is provided as a resource for Boccia coaches, with the aims to:

- build on existing introductory coaching resources
- provide an advanced coaching resource for state Boccia coaches
- provide an overview of the role of skill acquisition with the national Boccia PPP program
- share some of the key learning points from recent international competition

The document is not designed to replace existing coaching resources but rather provide additional and advanced ideas for the creation of environments for skill learning in Boccia. This document is not a one-stop recipe book of Boccia drills and games, but is provided to highlight some of the key concepts that can help you as a coach design advanced practice situations for club and state athletes looking to make the leap to that next level (e.g., National success, PPP squad). It is expected that coaches will:

- have read the document “Coaching Boccia: Introductory Coaching Accreditation ”¹ and other introductory material (see [resources section](#))
- have experience with coaching Boccia athletes at club and state level
- have athletes that are motivated to improve their Boccia skills
- attempt to implement ideas and concepts from this document and accompanying coaching material in a logical and systematic way over a realistic period of time, rather than isolated attempts at single drills or games

¹ <http://www.boccia.com.au/about/CoachingMaterial/>

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What is Skill Acquisition?

"I never teach my pupils, I only attempt to provide the conditions in which they can learn."

Albert Einstein

Skill in sport is the ability to perform a particular technique well, within the context of a competitive situation (i.e. under 'competitive pressure'), and demonstrating the ability to adapt to different situations (see pre-reading). This document is devoted to providing you with a range of background information to help you to develop a coaching approach that allows your athletes to learn the skills required at national level and beyond.

Skill acquisition specialists take an evidenced-based approach to enhancing skill and performance, specifically in understanding the critical aspects underpinning skills and designing and maximising practice environments. Skill acquisition specialists provide support in areas such as:

- Skills testing
- Training/ practice design
- Modified games
- Decision-making
- Feedback (timing and type)
- Effective instruction & demonstration
- Implicit vs explicit learning
- Dealing with individual differences
- Transfer of learning
- Use of technology
- Learning vs performance
- Coach education and development

The inclusion of skill acquisition support for Australian Paralympic Committee (APC) programs aims to provide: i) detailed reviews and tracking of Daily Training Environments (DTEs), ii) evidence-based practice design, and iii) representative skill testing.

Since beginning with the APC in a full time role in August 2013, skill acquisition support has been accessed by, and provided to a number of sports including Wheelchair Rugby, Goalball, Wheelchair Tennis, Shooting and Table-Tennis. In most

cases, this has resulted in detailed reviews of training and competition and has aided coaches in providing significant performance benefits. In other instances, support has been provided to coaches to answer specific questions, or target identified performance outcomes, such as increasing competition in practice or preparing athletes for particular international competition.

Skill Acquisition Specialists at the APC

Ross Pinder has worked as a Skill Acquisition Specialist and consultant with the APC managed sports since July 2012, in addition to providing advisory support across all Paralympic programs. Ross completed his PhD in motor learning/ skill acquisition in 2012 through Queensland University of Technology, after obtaining Bachelors (2007) and Masters (2009) degrees in Sport and Exercise Science from Sheffield Hallam University (UK). Ross has held research, teaching and applied roles and currently supervises PhD and Honours students through the University of the Sunshine Coast. His work has been published in several high quality international journals and presented at national and international conferences and coaching courses. Ross is particularly interested in maximising learning in practice through the design of representative tasks. Ross is currently Manager, Skill Acquisition and Performance Planning at the APC.



Contact: ross.pinder@paralympic.org.au



Jonathon Headrick is a PhD scholar in the School of Exercise and Nutrition Sciences at Queensland University of Technology, Brisbane. Jonny completed his Masters degree in 2011 in collaboration with the Queensland Academy of Sport, before working at the Australian Institute of Sport as a Skill Acquisition Scholar. His research interests include the application of an ecological dynamics approach for studying the role of emotion in learning and skill acquisition in sport. Jonny currently works as a consultant and skill acquisition specialist for the APC, primarily with the wheelchair rugby daily training environment in Brisbane.

Other contacts

The value of sharing ideas with others cannot be overstated or emphasised enough. You should take opportunities to share successful game ideas and discuss specific training scenarios with other coaches.

Table 1. Details for other Boccia contacts

State	Contact/ role	E-mail
ACT	Gary Preston (Delegate)	gary_preston@hotmail.com
QLD	Jason Mayweather (Delegate) Rob Marshall (State Coach)	mrjasonmayweather@gmail.com president@boccia.com.au
NSW	Ken Halliday (State Coach) Stacey Sedmak(Delegate)	KHalliday@cerebralpalsy.org.au SSedmak@cerebralpalsy.org.au
SA	Zoe Dix (State Coach) Emily Ayles (Delegate)	dixy_chik123@hotmail.com Emily.ayles@paralympic.org.au
TAS	Kevin Faulkner (Delegate)	kfaulkner@paraquadtas.org.au
VIC	Keegan Byrne (State Coach) Vicki Thorpe (Delegate)	kj.byrne@bigpond.com vickithorpe@hotmail.com
WA	Jill Bowman (Delegate)	bocciawa@gmail.com

Skill Acquisition in Boccia

Philosophy of practice

Skill learning is characterised by a relatively permanent change in behaviour as a result of practice over a period of time (Magill, 2011), suggesting that underlying factors have also developed (e.g., muscle function, neurological connections). In contrast, performance is simply the observable skill at a specific moment in time, and under specific conditions. Performance is not permanent and often affected by a range of factors, from fatigue or athlete motivation, to environmental conditions.

Often, coaches design training sessions that work on specific skill drills (e.g., repeating 1st ball practice to the same spot on the court) and allow the athletes to demonstrate rapid performance improvements over the course of a session, only for these improvements to disappear before the next practice session. Put another way, we tend to design practice for success rather than learning. Understanding the difference between the terms learning and performance is crucial for designing effective learning environments.

Table 2. Learning vs Performance

Learning	Performance
<ul style="list-style-type: none">• Relatively permanent change in behaviour• Change in an athlete's capability to perform a skill• Must be inferred from performances• Result of practice over longer period of time• Sessions promote variability and adaptability• Sessions allow and promote athlete to make errors• Within session variability but better retention and transfer to game contexts	<ul style="list-style-type: none">• Immediate improvement in performance that is not maintained• Refers to a specific point in time, under specific conditions• Refers to the execution of the skill• Observable behaviour• Sessions promote repetition and consistency• Sessions gradually reduce error based on trial to trial feedback• Within session improvements and consistency but less retention and transfer to game contexts

Historically, skills practice in target sports, such as Boccia, has been based on attempting to 'perfect' a specific skill using a task requiring the same response (i.e. distance, angle). It should be apparent from introductory Boccia coaching resources that an emphasis on technique in isolated and blocked (i.e. repetitive) practice designs is not as beneficial for an athlete's development as a games-based approach. The adage of "practice makes perfect" over-emphasises the role of quantity of practice and detracts from considerations of quality – skill acquisition specialists use an alternative motto of "repetition without repetition."² While repeating the same technique over and over again will lead to some refinement and consistency, learning opportunities are maximised when an athlete is required to adapt their performance to achieve the same outcome under changing demands. **This is an important point for coaches: although we want to see improvements in our athletes' skills, we should design training to maximise learning over seeking short term (within session and non-permanent) gains in performance.** Furthermore, practice designed for performance benefits tend to rely on controlled and repetitive drills, and as you will have learned from an introduction to a game-sense approach, does not best prepare an athlete for competition (i.e. decision-making demands, non-coach dependant). For example, an athlete who completes a training drill consisting of 30 knock-ups at a 4m distance will rapidly improve their accuracy and success rate over the course of the session. However, it is likely that their ability to see (perceive) this opportunity within a crowded end in competition will not be improved, nor will they be able to easily adapt this shot to different jack lengths of their opponent. The athlete in this example does not have to solve a problem, or reassess the situation before each throw – in fact there would be very little mental (cognitive) effort at all. An athlete who has to actively make a decision, problem solve, reassess a distance or the type of shot needed, and rely less on trial to trial feedback, will demonstrate greater skill learning. **As a coach, your role is to ensure that athletes are constantly challenged and made to solve problems to maximise learning.** One way this can be supported is through an increase in variable practice.

² This phrase is taken from Bernstein (1967): "...practice, when properly undertaken, does not consist in repeating the means of solution of a motor problem time after time, but is the process of solving this problem again and again by techniques which we changed and perfected from repetition to repetition. ...Practice is a particular type of repetition without repetition."

Practice variability

"Insanity: doing the same thing over and over again and expecting different results."

Albert Einstein

The 'knock-up' example above suggests the need for practice to be highly variable, allowing athletes to practice in a vast range of situations. For the previous scenario, a more functional approach would be to set up a range of knock-up situations at variable locations around the court, or use a modified game (see below) to encourage and reward the use of this type of shot. Alternatively, and in-fact maybe more beneficial, would be to intersperse these shots with other game skills such as a first ball, or a drive.

How you organise the distribution of practice repetitions can significantly affect the retention of skills. Research in a wide variety of domains, including target sports, demonstrates that when learning motor skills, increases in variability for practice repetitions leads to greater long term learning (retention) and transfer to different performance contexts (see Magill, 2011). One of the issues coaches face when adopting a more variable practice design that forces athletes to problem solve is that the athletes' performance tends to be more inconsistent within a session – coaches therefore assume that this inconsistency is a reflection that the practice task is not useful and the athlete is not learning (as their trial to trial performance does not necessarily improve). However, it is the variability itself that provides the advantage over blocked (consistent) practice conditions. Put another way – practice that looks messy is likely to provide more opportunities for learning! It should be noted at this point that practice that emphasises performance improvements (i.e. blocked) can have benefits for confidence, as the performer is able to see significant changes within a short session – coaches could use these strategically for warm-ups, pre-competition or for beginners. Due to this performance affect, however, blocked practice tends to result in both athlete and coach overestimating current skill level, which could result in masking of game weaknesses under variable (competitive) conditions or frustration when skills are not transferring to game situations.

The amount of variability within a practice session is related to the amount of cognitive demand placed on the athlete. As suggested above, an increase in variability increases the need for athletes to problem solve and engage more with the task to figure out the requirements for individual shots over the course of a session. Essentially, an increase in mental effort for each attempt can maximise learning and reduce the required repetition – a move to shorter quality practice sessions over longer sessions focussed on quantity (see [National team focus](#)). The benefit of this move goes beyond skill learning, and provides psychological advantages such as increases in engagement and motivation (see game-sense approach – Boccia introductory coaching document). As with all aspects of coaching, the needs and characteristics of the individual learner will also have a large impact on the type and extent to which a variable practice approach will be utilised. For example, a beginner may be overwhelmed by too much variability and not have the capacity to deal with this added information while they are initially learning to coordinate their shot (which may lead to frustration for both of you!).

As a coach, you should look to strike a balance but aim for the maximum level of variability available at a specific time, and attempt to replicate the demands placed on athletes in competition. Research has provided some evidence, however, that even with beginners, variability in practice can have a beneficial affect over blocked training designs for retention of skills, and increases the rate of learning over longer periods. Once a learner has established a basic movement pattern (e.g., a relatively consistent lob shot), they should be exposed to an increase in variability to increase mental effort required.

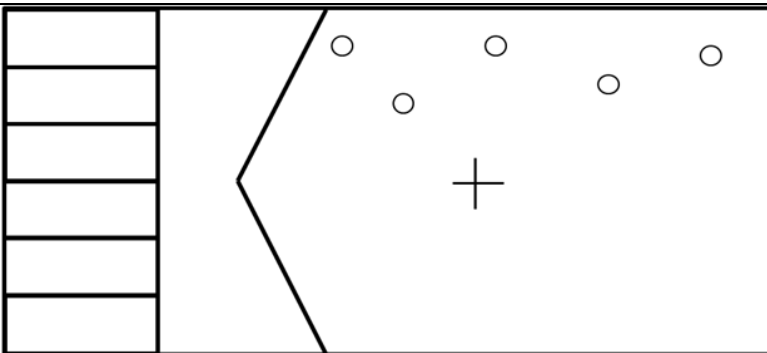
Practice variability can be created in a number of ways, from increasing the variability of demands within the same skill (e.g., changing the length for a first ball shot), to randomising the type of shot for each and every practice trial (e.g., making an athlete throw a first ball followed by a drive, and then a lob), or a combination of both of these. While practice can be designed to be either blocked or random (variable), there are endless combinations across the continuum that allow you to find a suitable challenge for each and every athlete (brief examples are provided in Table 3). Practice should be positioned at a level so that it is not too hard, but not too easy for each individual athlete. **As a coach you should strive to manipulate the practice task to provide a realistic but challenging environment to continually push**

the individual athlete both physically and mentally; this can be achieved through variability in skills training, and through a constraints-led approach to designing practice.

Table 3. Methods of distributing practice trials

Type of practice	Description	Example
Blocked	Same skill is repeated one after the other before moving on to different location or a different skill	6 x first balls to same (jack) location
Random (within skill)	Same shot is repeated but demands are changed between each shot or small block of shots	1 x knock-up at 5m 1 x knock-up at 3m 1 x knock-up at 6m
Random (between skill)	Different shots are completed each and every time	1 x first ball at 3m 1 x drive at 3m 1 x knock-up at 4m 1 x lob at 5m OR use a Boccia 'skill circuit' consisting of a range of shots around the court

Case Study: Balancing repetition and variability

Issues:	<ul style="list-style-type: none"> • Distinguishing between performance and learning • Providing a task which allows the coach to monitor performance while ensuring a suitable degree of variability to replicate game demands
Situation:	Fundamental skill practice – First ball
Traditional approach:	<ul style="list-style-type: none"> • Play jack and 1-6 balls to same location. Repeat at same or different location (e.g., team, individual)
Suggested modifications:	<p>Modifications to increase variability and replicate game demands:</p> <ul style="list-style-type: none"> • Maximum of 1-2 balls to a single jack position in succession • First ball (First phase; see below) to jacks placed around the court by the coach (replicating responding to an opponent) • Varying length across the entire court
Example:	Line x Length x 5
Court set-up:	
Rules:	<ul style="list-style-type: none"> • Place 5 jacks (or spare balls) at different and typical game lengths down the court (also see international insights below) • Offset the jacks to allow athlete a clear shot at each • Athlete gets three attempts at each jack and must attempt to get "on" or as close to the jack as possible • Athlete scores 1, 2, and 3 points for a ball that is within 1, 2, and 3 ball widths, respectively. 3 is the maximum score for any one ball • Athlete is aiming for the lowest possible score
Example progressions:	<ul style="list-style-type: none"> • Randomise the order of the task (e.g., long then short) • Athlete cannot play to the same jack twice in a row (i.e. increasing variability further) • Intersperse first balls with other types of shot (e.g., drives) • Shift in jack positions further down court to increase difficulty • Completion in teams/ pairs to increase importance of shots toward team total (inc. running scoreboard)

Constraints-led approach

From a constraints-led approach, movement coordination (e.g., the observable skill) is a result of the dynamic interaction of task, environmental and individual constraints (see Davids et al., 2008; Newell, 1986). The effect of a particular constraint is not permanent and will change over time or as an athlete develops further skills.

Task constraints generally refer to aspects of the practice task itself, and are the most easily manipulated by a coach. These could include the rules of the game, equipment used, court markings or number of concurrent games. Environmental constraints tend to refer to more external aspects such as weather or game environment (is the game indoors or outdoors?), temperature, humidity, or noise (e.g., crowd noise). Individual constraints refer to any aspect of the individual athlete that can impact performance such as physical conditioning, motivation, or fatigue.

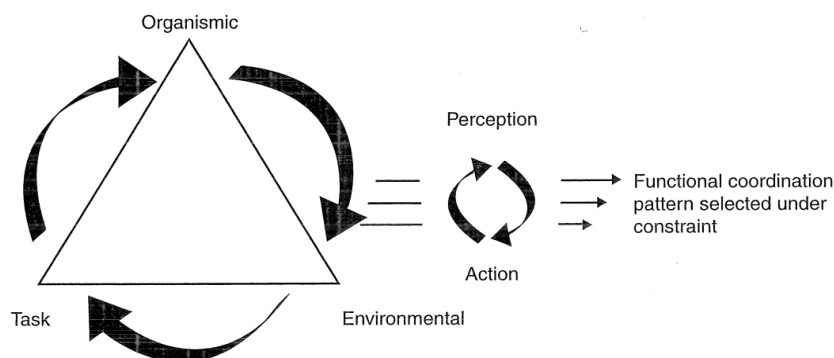


Figure 1. Constraints that affect skill execution

Changes to any one or more of these constraints will cause a change in the emergent behaviour (i.e. performance of that skill), and provides us with excellent possibilities to manipulate practice demands to force athletes to problem solve and adjust their performances. Furthermore, such an approach supports the roll variability plays in skill learning, allowing us to constantly adjust the demands of the task based upon one or more constraint.

A constraints-led approach promotes a less prescriptive approach than traditional drill-based approaches, with an emphasis on discovery and problem solving from

the athlete. **As a coach, you should look to control or manipulate these factors to guide athletes towards specific performance solutions, using questions to further facilitate exploration rather than explicitly stating the ideal response or behaviour.**

For example, if you want to encourage players to play in certain areas of the court, or use a specific type of shot, you would increase the points available for those actions rather than explicitly stating the outcome you want to see (e.g., any ball that changes the hold on the jack using a lob automatically scores a point; points scored on jacks within 30cm of the sideline score double).

Through this style of coaching, we have a greater chance of developing smart athletes that understand what, when and how to perform particular skills within the context of a match. This style of coaching requires a good understanding of both the skill requirements and the individual athletes as each will respond in a slightly different manner. Over a period of time, you will be able to predict how an athlete is likely to respond to a specific manipulation, and be able to further plan practice task constraints to target key areas for that athlete. Examples of the types of constraints to be manipulated presented in Table 4, along with the likely focus of such a change (note that you may use a particular manipulation to illicit a completely different response for an individual, or that two individuals may respond differently to the same change of task).

A note on individuality

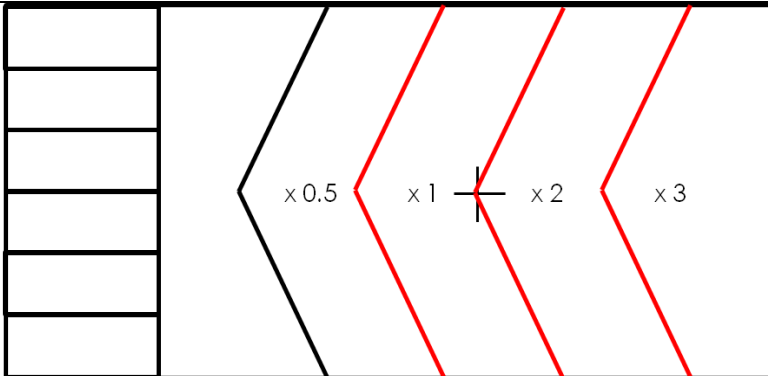
A constraints-led approach raises some important questions with regard to the idea of a 'perfect' technique. In many sports, there is still a notion that there is a single optimal movement pattern for a particular skill for all individuals: think back to when you were taught a tennis forehand or a cricket straight drive. Given what we have discussed here with the momentary influence of constraints and the added consideration of differences in muscle function of Boccia athletes and it becomes clear that this cannot be the case. Traditional coaching has relied on verbal instructions to guide athletes towards what the coach considers to be the optimal movement pattern. A constraints-led approach allows the athlete to discover their own solution that best suits their individual constraints, and allows you as a coach to carefully manipulate other aspects to force the athlete to adapt this technique across a wide range of situations.

This method also has an added benefit of moving an athlete's attention away from the internal movement and mechanics of the action (e.g., athlete thinking specifically about the position of the arm at release), due to a reduction in explicit instruction on these aspects. Research across a range of domains suggests that an internal focus is actually detrimental for skill execution (see Wulf, 2007). ***In your role as a coach, you should look to adopt a constraints approach or provide instructions that place emphasis on external factors when explicit instruction is necessary*** (e.g., ball landing position, ball-flight/ path, rather than arm position or release point).

Table 4. Example constraints to be manipulated in Boccia

Type of constraint	Examples	Action specifics	Focus/ Aim
Task	Rules	2 points for each point gained beyond cross Must predict shot outcome pre-release No verbal communication	Ability to play long and be aggressive in search of points Committing to decisions and reflecting on shot probability Importance of going out to look and see team-mates angles
	Balls	Use of super-soft balls	Ability to lob or remove on-jack balls using alternative methods
	Court area	Use of multiple 'V' lines with increasing point values	Increasing value of playing long and using back of the court
Environment	Crowd noise	Inclusion of predictable and unpredictable crowd noises	Ability to remain focussed in competition regardless of random noise. Ability to refocus.
	Court surface	Regular changes to surface type	Ability to adapt quickly to different surfaces. Ability to relate roll and distance to force/ ramp height
Individual	Fatigue	Completion of fundamental skills (e.g., first ball, 2 nd phase) at end of session	Ability to execute skills when fatigued; replication of competition situations (e.g., multiple games at national/ international competition)
	Increase 'value' associated with games	Increase anxiety and consequences of result	Ability to execute skills under 'pressure'
	'Instructions'	Ball must bounce past a specific line	To increase release height of the ball without explicit instruction on the mechanics of the arm

Case study: Promoting long play

Issues:	<ul style="list-style-type: none"> • Athlete being outplayed long at nationals • Poor accuracy at lengths beyond 5m or reluctance to play long • Accuracy and power of international opponents at 8m+
Situation:	Game play – Individual, teams or pairs
Traditional approach:	<ul style="list-style-type: none"> • Blocked practice at set distances under the direction (instruction) of the coach • Use and attempted perfection of short (preferred) jack lengths before whole court skill practice • Belief that games can be won by control of own jacks
Suggested modifications:	<p>Modifications to promote increased focus on long lengths:</p> <ul style="list-style-type: none"> • Reward athlete for choosing to play long against an opponent • Use statistics to highlight points scored in competition beyond specific distances, and jack locations in national/ international competition
Example:	Modified Game: Multiple 'Vs'
Court set-up:	
Rules:	<ul style="list-style-type: none"> • Unless stated standard game rules apply • Athlete receives points awarded following each end multiplied by a factor for the length of the jack (example above)
Example progressions:	<ul style="list-style-type: none"> • Change points available at different lengths • Change the location/ distance of additional 'V' lines • Change from use of 'V' lines to specific court areas (e.g., boxes) which promote athletes to play in areas of the court relevant to their classification/ skill level (also see international insights) • Reward specific actions with bonus points (e.g., first ball on and varying lengths)

Implicit learning: further benefits of the constraints approach

"Tell me and I will forget. Show me and I may remember. Involve me and I will understand."

Confucius

An additional benefit of this style of coaching is that it promotes implicit learning of skills for your athletes. This is sometimes a difficult aspect for coaches to contemplate, since traditional coaching programmes and courses place a large emphasise on the role of instruction and demonstration. As outlined previously, a constraints-led approach can reduce the amount of verbal instruction required, with the coach taking on more of a facilitators role once the athletes are engaged with the task (i.e. further manipulation and questioning).³ While there will be times when you want to provide an athlete with direct and explicit information regarding a technical aspect of their performance, a large amount of research (especially within the past 10 years) has begun to question the overuse of explicit instruction and suggest that it is largely unnecessary and many times detrimental to performance (i.e., harms rather than helps skill execution). Explicit instruction tends to be too restrictive and does not allow an athlete to explore and discover their own solution (or multiple solutions!), and increases the likelihood of them having an internal focus during skill execution (see above). Skills learnt in an implicit manner (i.e. with little or no formal instruction about the technical aspects of the movement) have significant advantages over ones where the athlete has to explicitly think about how they complete the task (and refer back to technical instructions).

³ Note that this does not diminish the importance of instruction and clear communication between coach and athlete over the goals and running of the session or outline of game rules, and for when explicit instruction is necessary. For an overview of the importance and methods of good communication see pre-reading.

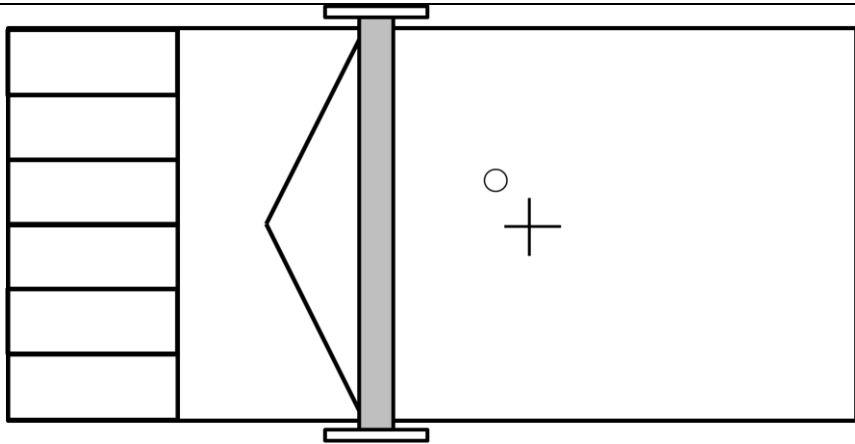
Implicitly learnt skills:

- can be learned as well as those taught explicitly, and rely less on complex instructions allowing the athletes to explore and try quicker in training sessions
- are less likely to 'break-down' in competition or stressful situations – this is sometimes referred to as 'choking'
- are successfully retained over time (i.e. skill execution is able to be replicated)
- are less susceptible to the influence of fatigue
- reduce attention demands on the performer as they do not have to think about the skill to be completed, and can use additional attention to look at other things (e.g., assess the game situation, check the time, consider what their opponents next move might be)

One approach that can promote implicit learning is the use of analogies to convey important coaching information. This method allows a coach to present specific requirements without reference to explicit knowledge or instruction. For example, in Tennis, a coach may teach an athlete how to grip a racquet by asking them to "shake hands with it" or using an analogy of a right angled triangle to promote top spin forehand skills (see Masters, 2008). Analogies should be tailored and meaningful to an individual, and the most effective ones will be ones which summarise a couple of key components of skill execution.

An interesting alternative to the use of analogies or metaphors could be to use a secondary task during skill execution during specific technical sessions – what we call a dual-task approach. For example, requiring an athlete to perform a cognitive task (e.g., simple counting, answering questions, singing out loud) while throwing prevents the athlete from over-analysing the execution of the skill and removes their focus from internal factors (e.g., their arm movement). This may be a particularly useful approach for individuals who have learnt specific skills explicitly, and there is now a need to transition them into more implicit or subconscious execution. If the athlete is able to link the outcome (e.g., ball position) with action, there is also a reduced need for explicit feedback from you the coach. **Your role is to find ways to enhance that performance feedback (see case study below). For learning, you should look to minimise explicit coaching feedback and allow the athlete to problem solve in an active way facilitated by further questioning or changes to game rules.**

Case study: Manipulation of task constraints for implicit learning

Issues:	<ul style="list-style-type: none"> • Athlete has difficulty throwing long (e.g., BC1/2 athlete throws downwards when attempting to throw with more power) • Athlete has a bias in their delivery (e.g., arm doesn't move through on desired angle)
Situation:	Coaching technical skills and shot execution
Traditional approach:	<ul style="list-style-type: none"> • Explicit instruction to increase release height • Focus on release point of arm or on movement of arm through swing
Suggested modifications:	<ul style="list-style-type: none"> • Removal of internal focus and encourage athlete to focus on external factors (e.g., court surface, balls on court) • Use of physical 'constraints' such as foam blocks, nets, barriers, or changes to chair angle
Example:	Increasing lob height using mini nets and modified games
Court set-up:	
Rules:	<ul style="list-style-type: none"> • Standard rules apply except for requirement to go over the net • Athlete is provided with external feedback (e.g., ball hitting or clearing net and resulting position) rather than explicit instruction from coach
Example progressions:	<ul style="list-style-type: none"> • Nets could be replaced by string, small barriers or blocks • Increase or decrease height, width and distance of net • Manipulate difficulty by moving jack closer or further from net • Change to all balls must go under a net/ string to encourage discovery of new solutions • Ball could go over or under, but double points are awarded for scoring balls that went over the string/ net • Constraints could be less permanent such as quick use of a stick/ umbrella or similar object to demonstrate ball flight to athlete

Context and chaos in the design of training tasks

"The truly creative changes and the big shifts occur right at the edge of chaos"

Dr Robert Bilder

Progressing from the manipulation of constraints to promote skill development in athletes, the next stage as a coach is to prepare athletes to compete in major competitions (e.g., Nationals/ International tournaments). **As a coach you should look to maximise the effectiveness of training tasks, aiming to increase transfer of skills to competition by including as much 'extra' information as possible.** In our work with APC programmes, we have developed and used modified games which maintain sport specific movement and skills, along with contextual information such as scoreboards and crowd noise rather than isolated training drills. These targeted modified games have been highly beneficial in preparing athletes for international competition across a range of sports, including Boccia.

Consider a situation when an athlete is leading by 2 points in an end, with 1 ball left to complete the end. What decision do they make? What type of shot do they play? Do they throw off? Now consider this is the last end of a semi-final and the athlete needs to win the end by 3 to tie the game. This is how quickly you might change a decision, and how important it is to practice for as many of these situations as possible. The inclusion of context is important as it provides situation-specific information that informs our final decision and players need to learn to use this information, just as they must learn the physical skill execution (also see [Phases of play](#)).

"You can set different scenarios, and have different balls, times, strategies...the more we have to adapt to the more situations we'll be comfortable in"

Jason Mayweather – Australian BC2 athlete

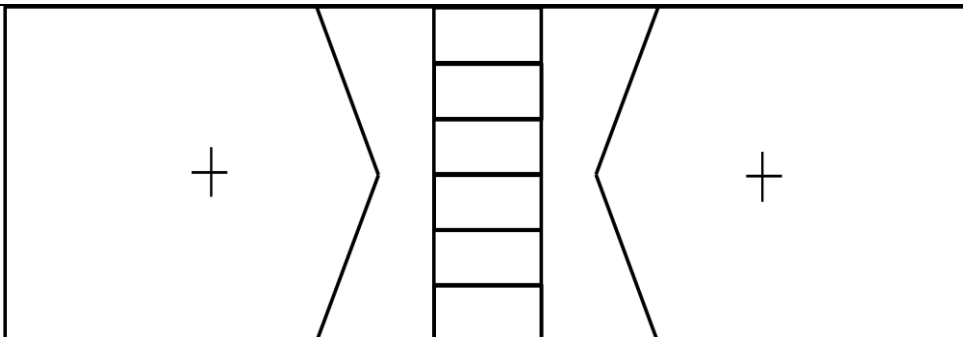
Additionally, the use of chaotic training games force players beyond their current limits, and allow them to experience a range of situations so that they are less likely to be unsettled in competition. This approach is a great way to find a practice task that is just beyond an athlete's current ability. Learning occurs due to changes in information, and information is related to the level of novelty in a situation – remember learning is messy! Repeating the same skill over and over will only provide limited development, and is not the best way to develop highly adaptable athletes.

As a coach, you should look to vary context and game-situation information as much as possible to provide athletes with a wide array of different experiences. You could adapt aspects such as:

- Court type and surface
- External factors such as light and noise
- Random events and changes to equipment
- Intentional referee mistakes or other rule infractions, or random penalty balls
- Adjustment of game situations
 - up or down by small and large scores
 - balancing of skill levels through score offsets
 - sudden changes to available time
 - changes to ball set or balls currently on court
- Changes to game format
 - Multiple target games
 - Athlete has to work out score or complete secondary task
 - Force athletes to complete specific tasks or shots (e.g., end must contain 1 each of a set list of shots)

The role of chaos in practice is also captured by the thoughts of the Head Coach in Coaches view (see below).

Case Study: The use of chaos for skilled athletes

Issues:	<ul style="list-style-type: none"> • Pushing skilled athletes or managing various skill levels • Using chaos to prepare athletes for competition • Using chaos to push athletes beyond cognitive processing limits
Situation:	General practice
Traditional approach:	<ul style="list-style-type: none"> • Use of skilled or able bodied opponents
Suggested modifications:	<ul style="list-style-type: none"> • Modify court and number of simultaneous games to increase demand on athletes, while maintaining lower level for others • Use of scoreboards and clocks • Have skilled athletes compete against multiple opponents
Example:	Back to Back games
Court set-up:	
Rules:	<ul style="list-style-type: none"> • Junior (less skilled) athletes play standard game • Skilled athlete plays two games back to back • Scores are kept separate or combined (e.g., team approach)
Example progressions:	<ul style="list-style-type: none"> • Limit number of balls or change to random sets (e.g., skilled player has 4 balls vs other player's 6) • Limit or adjust time allow per ball/ end (e.g., must complete both games in 10 minutes) • Limit amount of coach feedback • Sledging/ banter from other athletes or crowd noise • Limited score updates so athlete must keep track of both games on their own • Changes to available time each end • Skilled athletes to start on negative score • Move balls around when athlete is not looking to assess their processing ability

Coaches view: Peter King – National Head Coach

The following passage highlights the role of practice variability and representative training situations for developing elite Boccia athletes. The passage appears in Pinder et al., (2014).

What are the biggest challenges in designing representative training tasks, and what would your advice be for other coaches?

"The majority of Boccia athletes have the physical disability of cerebral palsy (CP), ranging in levels from moderate to severe. Typically this affects the athletes muscle function in either a commonly described "flight or fight" affect. Consequently, their physical reactions to external stimuli can be extreme and unpredictable. For example, the sound of applause from one competition court can cause a physical reaction to athletes performing on another court as if a loud low flying plane was going past. It should be noted that internal stimuli such as emotions can have the same extreme and unpredictable impact on performance. Athletes with CP have to perform accurate and precise tasks within an environment which their senses, and hence muscles, interpret as being one that is highly unstable and unpredictable. The key task for the coach is to recreate this in training to prepare them for performance. This can be achieved in a number of ways, by creating challenging modified games, and introducing unpredictable variables. Some obvious examples to achieve this include; setting multiple targets, complicate the victory conditions, create pressure of time restrictions, or just manipulate any dimension of the formal game that creates uncertainty. The options for introducing unpredictable variables is only limited to your imagination. For example, equipment being changed without notice, a fire alarm going off, a simulated opponent doing something unusual. While it is important to not let any "flight or fight" variable lessen focus, or unproductively corrupt the essential game skills, it can successfully enable an athlete to be prepared of any eventuality, or situation of high stress that would normally de-rail their performance."



Summary

The above sections above have provided an overview of some of the key concepts that APC Skill Acquisition Specialists use to support coaches in the design of practice tasks for Boccia athletes. The key messages for designing effective practice sessions for long term learning are to:

- structure practice repetitions that focus on quality (as related to game demands) rather than quantity
- structure practice sessions for learning (e.g., longer term focus) rather than for performance (i.e. short term benefits that do not last!)
- manipulate task, environmental and individual constraints to develop key aspects of individual athletes skills
- design practice games that allow the athlete to learn by themselves or from others
- guide discovery and problem solving using questioning and further manipulation of constraints
- maximise variability and chaos where possible

National team (PPP) focus

Daily Training Environment (DTE)

National athletes complete between 6 and 14 hours of targeted quality training each week depending on the aims of the current training phase. This time equates to the physical hours completed on court or in the gym, and does not take into account the time they may spend travelling, analysing video, discussing the game or attending to other key areas of preparation (e.g., nutrition, psychological skills). In terms of court skills, athletes have multiple two hour sessions which maintain a high performance focus throughout, have clear aims, and place importance on every shot – we prioritise focussed, quality practice over simply volume or number of balls.

Australian athletes split their time between fundamental game skills (such as phase work – see below), modified games and match-play (including scenarios). While it is important to ensure that all skills are being considered, athletes will also have priority skills which have been identified as a key aspect of that training phase.

Phases of play

With the national team, we have recently re-conceptualised the game of Boccia and have considered it to be structured into specific phases. This distinction allows coaches and athletes to practice specific aspects, track performance and identify potential areas for improvement, or areas which dictate game results.

First Phase

The **First phase** consists of the placement of the jack and first ball. The player has the first opportunity to control the end with a strong hold on the jack. A poor first phase allows an opponent to gain the upper hand. It should be noted that for all classifications an “on” jack is no longer indicative of who will go onto win the end – an effective first ball is necessary to ensure that a player gives themselves the best chance to remain competitive in the end and force their opponent to use as many balls as possible at each phase (also see classification summaries below). The ability to reproduce a strong first phase at various locations around the court is a characteristic of athletes at national and international level.

One critical question is: when is a first ball “on”? Ideally, “on” is touching the jack and is placed directly in front of it. Better still, a singles game jack “on” is directly in line of the opponent. It is better to be short of the jack, but in line, than close to jack but sitting on the side – a ball that is touching but on the side of the jack is not “on”. A ball sitting on the side of the jack presents a perfect target to the opposition and will increase their chances of responding well with the second shot – it is important that athletes at all levels recognise this.

Players should monitor first ball progress regularly by completing a measured session with a coach, playing partner or sport assistant. First ball skills should be included in all training sessions, whether that is through specific and targeted practice, in modified games or match-play. **The key for coaches is to reflect on the provided material and ask – how do I create first phase training that targets learning rather than short term performance?** Table 5 provides some examples of the modifications that can be made to vary first ball practice.

Table 5. Example modifications in First Phase play

Aspect	Modifications
Jack	<ul style="list-style-type: none"> • Player must throw the jack each and every time • Coach places the jack and moves every time • Restrictions to court areas (e.g., playing away from preferred areas) • Increase 'V' distance to promote longer jack play • Player must complete a 'circuit' of jacks around the court or identified locations • Tracking of first phase statistics using a 3,2,1, 0 systems for first ball quality (e.g., 0 = "on"; 2 = 2 ball widths and in line)
Balls	<ul style="list-style-type: none"> • Limit of use of a preferred first ball • Random ball set; use of hard and soft balls for athletes to adapt to • Hard jack to promote drawing shot onto jack
Angles	<ul style="list-style-type: none"> • Practice from all necessary individual and teams/ pairs boxes • Player must play a singles followed by a team first phase • Use of scenarios to ensure first ball blocks of specific boxes (e.g., dangerous opponent) • Specific tasks/ games which require the player to keep the ball 1, 2 or 3 ball widths from the jack and still control the jack (i.e., in line with opponent)

With the national squad, we track first ball rates in skills tests and competition (e.g., number of "on jacks" as a percentage of total jacks) as well as the number of balls it requires to change the play (e.g., quality/ difficulty of the first ball – see second phase).

Second Phase

The **Second Phase** is focussed on the decision and shot execution following the first phase of play when the opponent plays their jack and their first ball. The aim of the second phase is to 'switch' the play in the minimum number of balls, and ideally with one ball only. The second phase, therefore, consists of all balls required to switch the play following an opponent's first phase. In international competition, failure to secure the jack (or 'switch play') efficiently during the second phase can provide your opponent with a critical advantage. A player must develop the skills to understand when it is best to work for a strong hold on the jack, or when it might be

more appropriate to simply switch with the minimum number of balls (and allow themselves more balls for later phases of play).

This phase needs to be practiced by all classifications, and from different box positions and angles, and with both colours of balls. After each Second **Phase you should encourage athletes to consider how well they played.** How many balls did it take to hold the shot? Did you secure the head of the jack? Have you left your opponent blocked out?

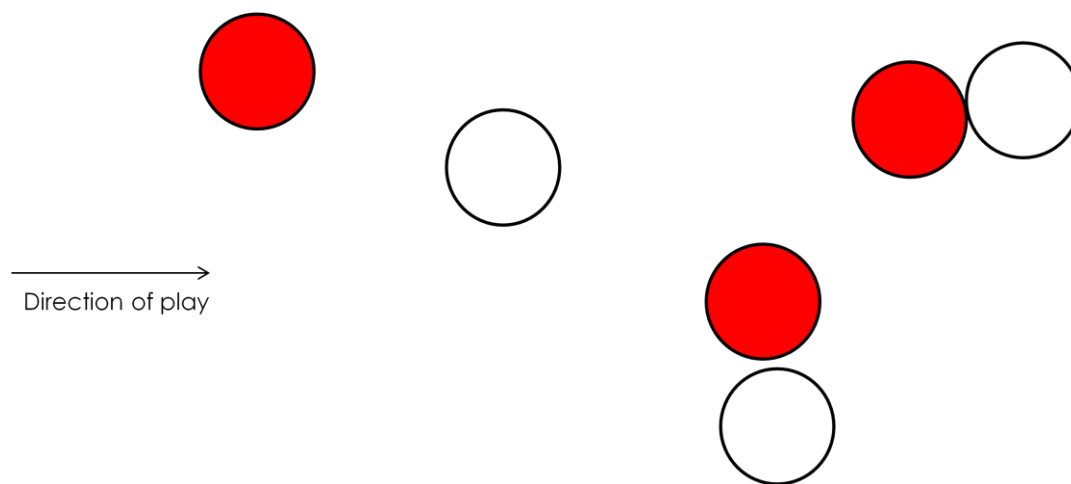


Figure 2. Typical second phase situations all requiring different approaches or responses (Note: Only one of these reds is “on” – see First phase).

To prepare players for higher levels of competition, **coaches should look** to make second phase situations variable (e.g., length, distance and angles between jacks and first balls) and tough (e.g., lots of “on” jacks). Table 6 provides some more manipulations for second phase practice. It is important that First and Second phases are often played out in full ends, so athletes can link the result of phases of play to game results (also see Table 8).

Table 6. Example manipulations in second phase play

Aspect	Modifications
Rules	<ul style="list-style-type: none"> • Coach places the jack and first ball every time • Restrictions to court areas (e.g., playing away from preferred areas) • Increase distance between jack and first ball • Constantly changing angle of first phase • Player must complete a 'circuit' of first phases around the court or identified locations • Tracking of second phase statistics to increase pressure on players (e.g., number of switches, average number of balls per switch) • Completion from all possible team and individual boxes • Completion of the same first phase set-up from multiple boxes to increase understanding of angles
Balls	<ul style="list-style-type: none"> • Random ball set; use of hard and soft balls for athletes to adapt to • Use of soft balls in first phase – requirement for players to remove difficult balls from the jack • Points for hitting or avoiding specific balls (e.g., encouraging different types of shots)

Middle Phases

Middle phases are essentially replications of the second phase during game play and, again consist of the balls taken to switch the play and change the hold on the jack. The final middle phase ends with the first player or team to use up all of their balls. The effect of First and Second phases on middle phase results should be emphasised with athletes as this demonstrates the level of control they have over the end, and provides them the best chance of controlling the End phase. **As a coach, you can allow all phases to play out, manipulate current ends, or specifically set up typical game scenarios your athlete needs to work on** (e.g., set up head and one ball less than an opponent).

End Phase

The **End Phase** is the last phase of the end, when the player with the only remaining ball(s) is directed to play. That player knows that they have the last opportunity to affect the result, and that their opponent cannot reply (unless they have penalty balls to play). The End Phase challenge to the player could be either:

- Overturning points held by an opponent
- Adding to a point already held

How well an athlete plays this phase is crucial to the final score, and ultimately the ability to win tight ends. The importance of playing the End Phase well is vital to success, and more often than not in elite games, it is the ability to add the second or third point that makes the difference between a win and loss. Playing the End Phase well depends partly on shot execution, but critically on evaluation of the state of play, considering the shot options, and then choosing the best option. Frequently this is all done in very short time periods, and so needs to be replicated in practice.

End Phase starts as the opponent begins to play their last ball, and the player should already begin to be considering the likely options that they will be left with. They should also be processing the important information available to them. Table 7 provides some examples of the type of questions an athlete might use to assess the situation.

Table 7. Example questions to promote with athletes approaching End Phase play

Important strategic information to consider prior to the start of the End Phase
<ul style="list-style-type: none"> • What is the current End score Game score - how many points do you need? • What balls are they? – do you have a hard ball or soft ball left? • What type of opponents ball is holding shot – is it a soft ball which is difficult to knock off? • How many balls do you have left to play? • How much time do you have left? – can you effectively get all your remaining balls out?
Reassess following an opponent's final ball
<ul style="list-style-type: none"> • Has anything changed? – did a crucial ball move to change the score? • Do you need to go out and have a look and gather more information? • A Team or Pair should now communicate and share information to help make the right decision
Important local information to help the player decide on the appropriate shot
<ul style="list-style-type: none"> • Do you need to knock a ball out to open up a line to the jack? • Which of the opponents' balls is closest to the jack? – which ball needs to be moved? • How big is the scoring zone around the jack? • Knock a ball up? – can you move it up the distance required? • Create a gap? Maybe a gap for your team mate • Draw into an existing gap? Is the gap big enough to get in the balls required • Push the white back or sideways? – to push towards your balls or into space • Can you open up a different line by moving around your box – going backwards to find a gap • Do you need to play a set up ball to create a ricochet option? To place a ball in around the side of a blocking ball • Can you use an existing ball to ricochet in from? Does it present the right angle • Can you jump a ball up and over? – do you have the right ball to flip up, or the right platform of balls to push up and over from

Table 8 provides an overview of the phases of play for an example end. In this example an efficient **second phase** from blue forces red to use three balls in the first of the **middle phases**, and hands the advantage to the blue player (who has two balls more than red to play at this stage). This is then supported by a one ball switch in the next **middle phase** (blue player averages less than two balls per switch at this stage!). Despite an efficient two ball switch by red following this, the red player has used all their balls and blue has earned the **end phase**. The blue player now has three balls to convert a -1 score line into a positive and achieves a winning end of

+1. Strong second and middle phases ensured that blue controlled the game and gave themselves final say over the score.

Table 8. An example of an end broken down into phases of play

Player	Action	Phase
	Jack and First ball ("on")	First phase & "on" jack
	1 x drive (partial hit on first ball) 1 x ball on jack (just inside 1 st red)	Second phase & 2 ball switch
	1 x drive (miss) 1 x draw (side of jack) 1 x rebound off previous (holds)	Middle phase & 3 ball switch
	1 x drive (opens up jack, leaves 2 nd blue thrown on, but jack open)	Middle phase & 1 ball switch
	1 x draw to open jack (still not holding) 1x drive to push ball on (holds)	Middle phase & 2 ball switch
	1 x drive (open up space)	3 ball End Phase
	1x lob (drags jack backwards)	-1 score converted to +1
	1 x drive (push up previous blue)	3 balls resulting in 1 point

As a coach you should look to reinforce the importance of all of these phases towards end and game results, and use the concept of 'phases' to modify practice activities for targeted development.


Modified Games

As previously discussed, a large focus in practice should be the use of modified games that are structured to develop specific and targeted skills. The benefits of modified games over traditional drills include:

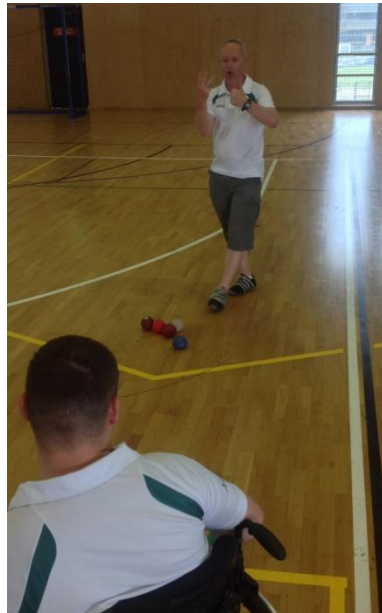
- providing game-situations to maximise practice efficiency and quality
- ability to manipulate rules regularly to increase variability and problem solving and allow athletes to gain experience in a range of game situations
- ability to have different rules for each athlete to work on individual goals/ skills
- providing practice scenarios to solve specific problems or prepare for international opponents
- preparing athletes that not only have appropriate skills but know when and how to implement them in game situations
- generally fun and motivating for athletes

You could develop and adapt games to encourage specific actions or strategic objectives (Example I; also see [constraints section](#)), prepare for specific opponents (Example II), assess and monitor the development of a specific skill (Example III) or push players beyond their current limits (Example IV).


Example 1

Game:	'Backcountry'	
Description:	Creating potential competition scenarios to utilise balls placed behind the jack	
Aims:	<ul style="list-style-type: none"> • Increase tactical awareness and decision-making demands • Create situations that explore the use of balls behind the jack 	
Equipment:	<ul style="list-style-type: none"> • Standard court area • Athletes preferred ball set 	
Rules:	<ul style="list-style-type: none"> • Set up a head with 1 or 2 opponents balls placed at the front of the head of the jack • The athlete then purposefully plays a ball behind the head to utilise in their challenge for dominance • The athlete now attacks the head to push the jack towards the ball placed behind. Ideally, the jack will become sandwiched between two of their own balls to assert a new dominant hold on the jack 	
Modifications:	<ul style="list-style-type: none"> • The full end will be played out to see if the ball placed behind was effective in winning, or effecting the end • The coach could place the ball behind, or adjust the ball played • Practice at different lengths and around the court • Create a game scenario when attacking to win the end is essential rather than more passively blocking a "held" jack • Change ball type in increase difficulty in controlling the end • Begin end with negative points to force athlete to be aggressive in search of switches 	
Coaching questions:	<ul style="list-style-type: none"> • Where would be the ideal place to put a ball behind the head? • How best can you use the ball placed behind? • Have you created a dominant position by using the ball placed behind? • How and when would you use this option? • What type of skills would this strategy help to counteract? • Would you consider that a viable option in a competition game? 	


Example II

Game:	'Staying with Leung'	
Description:	Efficient switching: Replicating second and middle phase demands of international competition	
Aims:	<ul style="list-style-type: none"> • Increase tactical awareness and decision-making demands • Create artificial BC2/3/4 End which has 6 or more phases of play 	
Equipment:	<ul style="list-style-type: none"> • Athletes preferred ball sets, and opposing set • At least half a standard boccia court • Coach to act as opposition 	
Rules:	<ul style="list-style-type: none"> • Coach plays jack and puts 1st ball "On" • Athlete must remove 1st ball and hold shot with max of two balls • Coach attacks head to remove "on" ball, and places new "on" ball • Athlete again has to remove "on" ball and hold shot with a max of two balls. This is then repeated until the athlete has no balls left • Aim is for the athlete to force game into at least 7 Phases of play. 	
Modifications:	<ul style="list-style-type: none"> • Advanced athletes may be able to force more than 7 Phases of play by executing excellent knock out balls, using the existing balls in play, or creating some "luck" (1 ball switches) • Place the jack at different lengths around the court, but start at shorter distances first • Increase difficulty of switch by including more blocking balls or limiting shot options (see picture) • If coach manages to knock off and hold with the first ball of each phase then continue with result – elite opponents will be able to achieve this • End phase should be played out to test outcome. Coach or server should have the End Phase, and par is winning this End by 1pt • Advanced challenge – athlete plays both red and blue and attempts to achieve maximum number of phases (e.g., 11) 	
Coaching questions:	<ul style="list-style-type: none"> • Seek reflection on the strength of the new holding ball • Review the shoot options available • Is it possible to use a ball in play? • Who is controlling the End? • What is the athlete planning 3 or 4 shots ahead? • If tournament success depended on this End - how does the athlete feel? 	

Example III

Game:	'Lobbing challenge' or 'Driving challenge'
Description:	Repeatable skill test for monitoring lobbing skill
Aims:	<ul style="list-style-type: none"> • Provide both variability and control in lobbing and driving development • Create typical game situations for all classifications (e.g., driving for BC3s) • Allow athlete to track progress with a game 'score'
Equipment:	<ul style="list-style-type: none"> • Multiple Jacks with first balls "on" as depicted below • Use two coloured balls if you do not have enough jacks  <ul style="list-style-type: none"> • Half court area and 'V' • Athlete preferred ball set
Rules:	<ul style="list-style-type: none"> • Athlete must lob jack backwards (BC2/ BC4) or drive coloured ball off jack (BC3) • Must be able to see more than half of the jack as a result of the shot – otherwise situation replaced • Once complete that head is removed • Athletes cannot play to same head twice in a row (unless last remaining head) • Score is number of balls required to complete the task
Modifications:	<ul style="list-style-type: none"> • Set up jacks on top of another ball. First phase to knock jack backwards, before it is replaced behind as before (e.g., both have to be completed before head removed) • Drive or lob has to result in switch of play in one ball to be completed (advanced skill) • Increase number of balls around the head or include a ball behind the jack • Limit athlete to a maximum number of balls (e.g., 24) • Increase difficulty of "on" with changes to ball type
Coaching questions:	<ul style="list-style-type: none"> • How could you increase your control during lobbing? • What effect does the angle the drive hits have on i) jack movement? ii) final position of your ball? • What is the most efficient way to switch the play in this situation? • What impact would this shot have on playing out the end?

Example IV

Game:	'Stranglehold'
Description:	Multiple target game for skilled athletes
Aims:	<ul style="list-style-type: none"> • Increase tactical awareness and decision-making demands • Encourage attacking shots, and aggressive game plan • Pressure of restricted time, and changing direction frequently
Equipment:	<ul style="list-style-type: none"> • Athletes preferred ball sets + 1 extra jack • 1 x Coin (for the toss) • Score board and clock/ timing device
Rules:	<ul style="list-style-type: none"> • Played on normal court with a max depth of 6m • Each player to have all their ball set • Each player plays their jack + 1st ball • Coach the places a third jack, equidistant to both players  <ul style="list-style-type: none"> • Each player plays in turn, but cannot play to same jack consecutively • 1 min per ball with the score board adjusted after each shot • Players can ask questions of referee, and go out and look • The winner is the player at the End who has accumulated the most points over the 3 jacks
Modifications:	<ul style="list-style-type: none"> • Can be played with Singles, Teams or Pairs – a maximum of 12 balls per team is ideal • Get players to use their red and blue balls so identification of balls around a tight head will be a challenge • Allow mobility across boxes to create more angle variations • Encourage communication by both Teams or Pairs in the opponents time to maximise analysis • Award penalties for specified indiscretions • Coach non playing team while they wait to play the next shot
Coaching questions:	<ul style="list-style-type: none"> • Where can you get the biggest change of points? • Where can you score the easiest points? • Consider the likely success of using attacking shots • Which jack is the key one for you to control at the end? • How effective was that defensive shot? • How well were you able to change focus between jacks?

Skill testing and assessment

We have also begun designing and implementing representative skills tests in camps and daily training environments (DTE). Such tests will allow us to objectively demonstrate improvements in performance across a range of skills and provide evidence for the effectiveness of interventions and DTEs. Skills tests place accountability on athletes' skills and put them under artificial 'pressure' which can be useful for tracking development. With the national squad, however, we place a large emphasis on in-game statistics to provide us with the best indication of development (e.g., First phase percentage in international games is preferred to First ball rates in skills tests), but this does require a significant investment in the coaches time (e.g., collection and summarising game statistics). For those of you who are interested, an example of a simple (pen and paper) statistics collection is provided in Table 9.

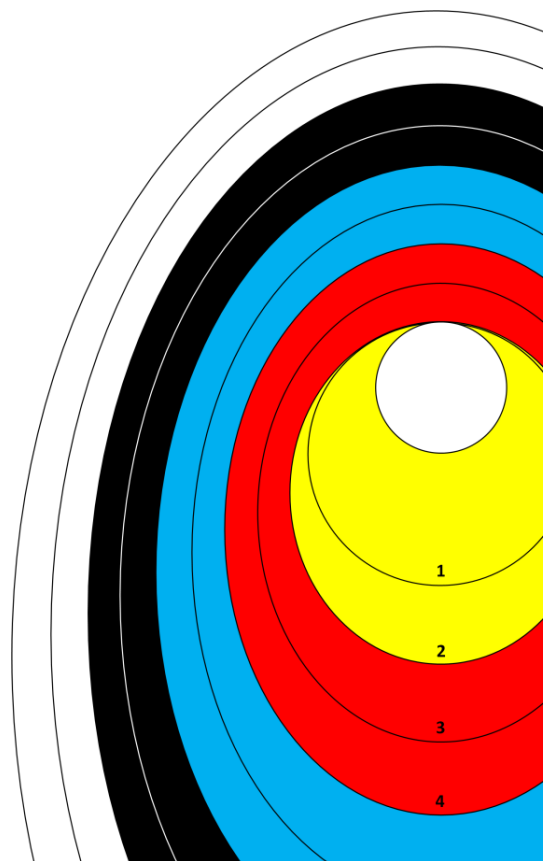
Table 9. Simple analysis sheet for phases of play

Phases	Criteria	Score	Analysis/ comments
1 st ball rate	On Off	3 3	Some TBPUL. (To Be Pushed Up Later) OK rate if switches are good. See below
2 nd Phase rate	Switched Not switched 1 st ball 2 nd ball 3 rd ball	6 0 3 3	Good 2nd Phase results. Total of 6 switches achieved against strong "ON" 1 st balls. Only 9 balls in total used in these six 2 nd Phases
Middle phase ball switch rates	Switched Not switched With 1 ball With 2 balls With 3 balls With 4 balls With 5 ball	9 3 2 4 1 0 5	This is the key area which highlights the weak Ends lost. 5 of these Phases used up 5 balls each time, and on 3 of these a successful switch was not achieved. Key End Phases were not controlled
End Phases controlled	Controlled Not controlled	6 6	Only 50% of End Phases were controlled.
End Phase conversions	Lost points No change	1 1	19 balls and added 4points Opponents had 21 balls and added 6pts
# of balls to use 1 ball: 2 balls: 2 3 balls: 3 4 balls: 2	Added 1pt Added 2 pts Added 3pt3 Added 4pts Added 5pts	4	

Skills tests, however, are a great way for state players to assess and track their fundamental skills. Information regarding the tests will be distributed to the states and allow you to monitor players against national level benchmarks. An example of a multi-skill test is provided in Appendix 2. **As a coach, you should look to monitor athletes' skills to identify opportunities for development, and design tests which suit the current level of your athletes and the skills you have been focussed on.** Tests should:

- replicate competition timings and demands (e.g., game rules)
- reflect the importance of different phases of play
- allow athlete to repeat at regular intervals (e.g., provide some level of control)

Linked with testing, the use of various targets is a great idea for junior athletes. Targets provide an external focus, promote feedback on performance without explicit coaching feedback, and can be used to track skills over time. **As a coach you should use any physical constraint you can think of to promote specific skills, demonstrate a coaching point (e.g., where the space is around the jack), or to 'force' athletes to discover new solutions.** A critical point though – change and remove these regularly. Remember the athlete must learn to use the information available to them during competition and must not become dependent on information that is not readily available to them in this context (which includes your feedback!).



Insights from International competition

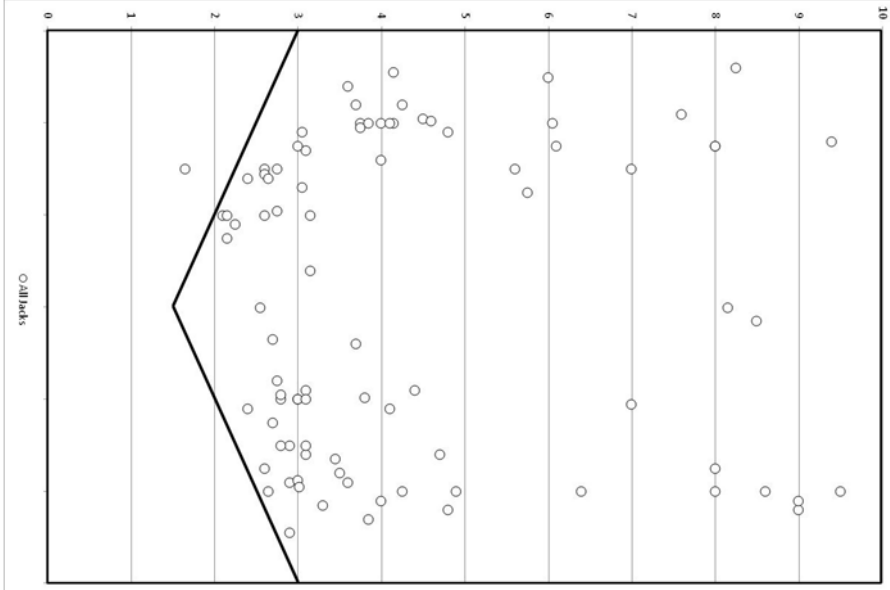
The information provided below is summarised from observations and data collected during the 2013 Asia-Oceania Championships. This information was collected for planning of skill development tasks for athletes at national and international level, but may provide some valuable insights for long term demands on aspiring athletes. Crucially, our observations support the concepts and recommendations provided in this document, such that:

- Athletes must be provided with chances to explore variable throwing techniques and encouraged (and rewarded) to 'try new things'
- Athletes must be able to play in all areas of the court, including playing long on demand
- Athletes must be provided with variable practice environments that mirror the typical demands of competition (e.g., changes in length, uncertainty of opponents skills, performance under competition 'pressure')
- Athletes must treat first ball as a routine rather than a victory. The role of the first phase is a vital skill but must be considered to be one part of a game strategy
- With little control over the types of balls used in international competition, athletes must be able to 'switch' and deal with very soft balls (even when "on")
- Hard balls can be used in specific strategies (e.g. as a knock out ball for BC3s), but will not will provide success nationally or internationally due to the reduction in control

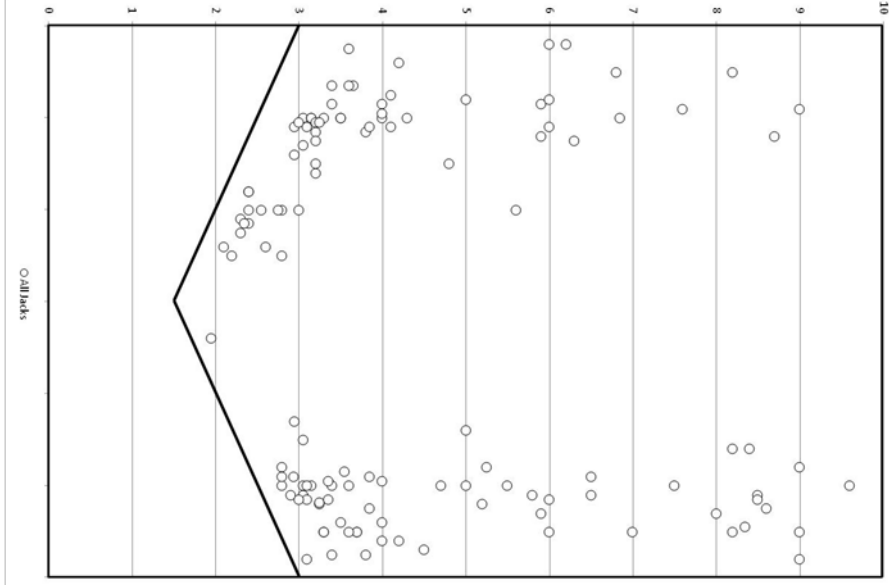
While the general points above points relate to all athletes, observations have been summarised and broken down by classification to provide some more specific detail.

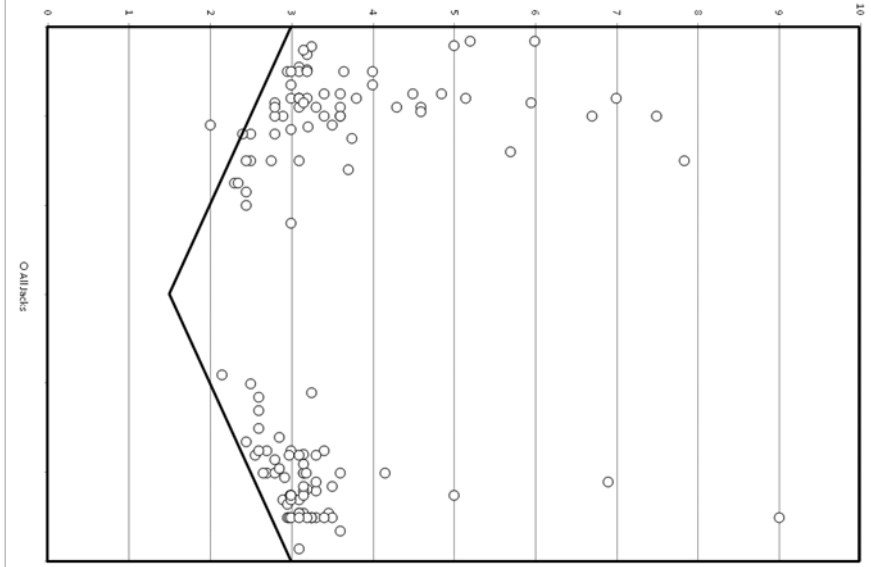
Classification breakdowns

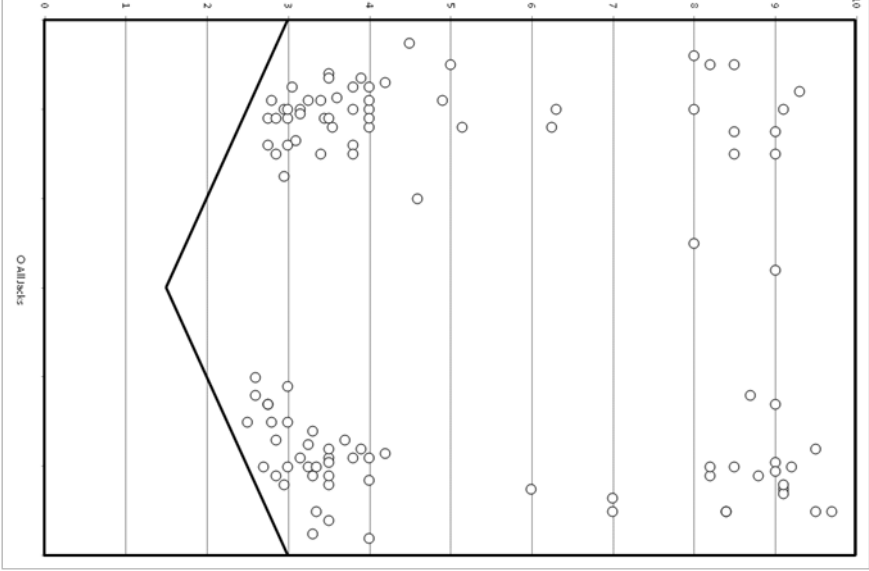
BC1

General:	World class BC1s show multiple successful throwing styles, including both over-arm and under-arm techniques. The most successful athletes also gain an advantage by using their chairs to 'hang off' and playing short. This reinforces need for athletes to find their own (non-prescribed) throwing style.
Key skills:	Successful athletes are able to attain on-jack percentages of 60+. Although favouring shorter distances, successful athletes must be able to play (with consistency) to 8m+. Athletes with very little consistency can win pool games just through an ability to throw longer than their opponent (similar to BC2), so athletes must be able to throw to 8m on demand. Successful athletes must also be consistent enough to group 4+ balls per end and have strategies to minimise loss of points against softer jack and first balls (as a minimum). Top athletes in classification are able to drive balls off the jack, with 'on-jack' not being a victory but a routine (including removal and replace (consistent across all classifications). Of all classifications, BC1s have the most sporadic and variable jack positions – critical that athletes practice to every possible location (and practice under highly randomised conditions that replicate what they might face in competition – see below).
Data:	<ul style="list-style-type: none"> • "On" of collected data <50% across competition • "On" percentage >60% for top 4 athletes • ¼ of jacks collected thrown beyond 5m
Jack placement map:	

BC2

General:	<p>World class BC2s show multiple successful styles – both over-arm and under-arm. Successful athletes also demonstrate an ability to use more than one style (e.g., lob and a dart style dependant on game situation and jack length). Some athletes have the range and power of BC4 athletes (e.g., Vongsa can lob a ball to 8m). Traditional (roll) style of play is not common among successful athletes. Most successful athletes also gained advantage by using their chairs to ‘hang off’ and playing short (also see BC1). Top athletes are able to play both short and long and adjust their strategies (and jack placement) based on opponent and game situation.</p>
Key skills:	<p>Successful athletes had an on-jack percentage of 60+. Getting on jack in BC2 classification generally meant that the athlete was able to control the end (watch Jeong for great examples). However, I predict that by 2016 the elite in this group will need to be able to remove balls on-jack (which some already do; also see BC1 – change of mentality required regarding ‘on-jack’). Successful BC2s share some characteristics with BC4s, such as long arm swings to generate power – allowing removal of multiple balls (e.g., Vongsa); ability to roll balls up (flop) on to others (e.g., Yeung; also see SE game from HK invitational); effective lob/dart to 3-5m (e.g., Yan). Successful athletes are able to group 5+ balls within <1m area (up to and beyond 8m). Ball ‘quality’ a more important consideration than in BC1 classification.</p>
Data:	<ul style="list-style-type: none"> • “On” of collected data <50% across competition • “On” percentage >60% for top 4 athletes • 1/3 of jacks collected thrown beyond 5m, however, do not tend to secure jack with first ball • Generally use soft, worn jacks
Jack placement map:	

General:	<p>Successful athletes demonstrate an ability to use more than one release style and often have greater function for release and alignment (e.g., Kim). This combined with new ramps (e.g., retractable ends with clear Perspex ramps – THA) allows reduction in preparation time and efficient shot execution. Successful athletes favoured playing short, but executed flawlessly. Only Kim (KOR) purposefully played long as a 2nd jack to a couple of opponents (i.e. having spotted a potential weakness – See Figure BC3). Successful athletes have functional/ individualised ramps. Very little variance in ball roll – reinforced need to analyse ball consistency and ramp affects.</p>
Key skills:	<p>Successful athletes had an on-jack percentage of 75+, the highest percentage across classifications and most likely to result in winning ends. Most successful athletes can remove soft balls on soft jacks, and were also able to remove an on-jack ball and replace using 2 balls. Successful athletes rarely (if ever) miss drives, and demonstrated ability to roll balls up (jump) on to others (e.g., Visaratanunta). Athletes must be able to group all 6 balls within a 50cm area (3-5m). Successful athletes are able to see shots behind the jack and secure from any potential angle in 2 balls. Creation of modified games/ scenarios in DTE which stress the need to secure against drives and jump shots will be beneficial.</p>
Data:	<ul style="list-style-type: none"> • “On” of collected data ≈60% across competition • “On” percentage >70% for top 4 athletes, and closer to 85% for Kim and Jeong (KOR) • Very few jacks collected rolled beyond 5m • 2 key areas just over the ‘V’
Jack placement map:	

General:	<p>Successful athletes demonstrate an ability to use more than one release style (e.g., Lin – long powerful swinging arm and a reduced lob for shorter jacks). Most successful athletes use an underarm (or sideways – e.g., Leung, Larpyen) action. Successful athletes favoured playing short, but executed flawlessly. New athletes attempted to play longer (e.g., JPN) but were not accurate in securing jack consistent at 7-10m. All tended to use very soft worn balls (generally handlife or boccas – some resembling bean bags or hacky sacks) BC4 DTE implications to counter this or increase ability to remove these balls from on-jack, and monitor changes to ball regulations.</p>
Key skills:	<p>Successful athletes had an on-jack percentage of 75+, the highest percentage across classifications but have little influence over final end result. Likely winner of end is the athlete who forces the first mistake (see Lau for effective first balls). Successful athletes are able to remove on-jack ball and replace using 2 balls; on-jack removed and replaced – end effectively begins following the first missed drive or replacement (first ball 'dance'). Successful athletes do not have more than 2 ineffective balls per game. Successful athletes demonstrated lots of power to drive out multiple balls – there is no possibility to be successful by blocking out the front of the jack. DTE must run scenarios looking to secure behind the jack and playing against 2-3 ball end phases. Successful athletes have power (e.g., in a drive or lob that can move multiple balls) and accuracy – It is not possible to be successful without both at this level. All successful athletes can lob with a high degree of precision and consistency to 5m (e.g., Zheng's ability to land on a specific part of the jack; Leung's warm up routine).</p>
Data:	<ul style="list-style-type: none"> • "On" of collected data ≈60% across competition • "On" percentage >80% for top 4 athletes • 4 distinct pockets of jack placement (see Figure BC4) – useful information to use for creation of scenarios/ modified games, and monitoring of DTE volumes.
Jack placement map:	

Useful resources:

Coaches are encouraged to use any resources available to spark new ideas and different ways to manipulate aspects of the game to promote skill development in their athletes. Some resources specifically relating to Boccia are provided below. **You should also** take any opportunity to watch other coaches in action and consider how practice ideas from other sports could influence or inform your approach. When reviewing resources or observing other coaches, consider:

- How much does this rely on explicit instruction?
- How could this be provided to the athlete so they could discover a solution from themselves and problem solve?
- How could I manipulate the constraints to progress this game/ drill?
- How well does this replicate competitive conditions? What small changes could I make to increase how representative this task is?
- What questions could I ask the athlete that could give them a little more direction and facilitate further discovery?

<http://www.boccia.com.au/about/CoachingMaterial/>

<http://www.boccia.org.nz/resources1.html>

<https://bocciaengland.org.uk/coaches/resources/>

<http://www.ccpsa.ca/en/sports/coach.aspx>

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Recommended readings:

Davids, K., Button, C., & Bennett, S. (2008). *Dynamics of Skill Acquisition: A Constraints-led approach*. Champaign, IL: Human Kinetics.

Farrow, D., Baker, J., & MacMahon, C. (2008) *Developing Sport Expertise: Researchers and Coaches put theory into practice*. London: Routledge.