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**Where's the Money? Incentives, Coaching, and the  
Long-term Athlete Development Model**

**G. Cornelis van Kooten**

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For copies of this or other REPA working papers contact:

REPA Research Group  
Department of Economics  
University of Victoria PO Box 1700 STN CSC Victoria, BC V8W 2Y2 CANADA  
Ph: 250.472.4415  
Fax: 250.721.6214  
<http://web.uvic.ca/~repa/>

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# Where's the Money? Incentives, Coaching, and the Long-term Athlete Development Model

G. Cornelis van Kooten

**Abstract:** The purpose in this paper is to examine the effectiveness of the long-term athlete development (LTAD) model compared to a model based on economic incentives. The emphasis, however, is on the LTAD model and reasons why it is incompatible with coach education, particular the coaching of judo. The major influences on the LTAD approach are reviewed along with recent evidence that leads to questions about its usefulness. While Judo Canada has attempted to implement the LTAD model in its program to train coaches, there remains a great deal of incongruity between the LTAD and the pedagogy that often characterizes judo. As a result, coaches who follow a program of certification do not, subsequently, employ what they have learned but, rather, return to their 'old ways'. I argue that the incentives for becoming certified are wrong. I conclude that, rather than the attempt to standardize coaching via the LTAD model is misguided because a system that facilitates innovation is desired. Financial incentives whereby coaches and athletes are amply rewarded for success provide a better route to innovation and the Olympic podium than long-term athlete development model.

**Keywords:** Incentives and sport performance; Pedagogy of coaching; psychology and sport; nurture vs nature; judo; thinking fast and slow

**JEL categories:** A12, L83, Z23, Z28

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## Where's the Money? Incentives, Coaching, and the Long-term Athlete Development Model

In an effort to improve its international standing after a dismal 13<sup>th</sup> place finish at the 1988 Calgary Winter Olympics, the Coaching Association of Canada (CAC) implemented a National Coaching Certification Program (NCCP) that adopted the long-term athlete development (LTAD) model as the guiding principle for coaches in 55 Canadian sport organizations (Canadian Sport for Life, 2015; Bayli, Way & Higg, 2013). Subsequently, Canada experienced notable successes Winter Olympics, particularly an overall 1<sup>st</sup>-place performance at the 2010 Vancouver Winter Olympics and 3<sup>rd</sup>-place at the 2014 Sochi Olympics. Canada successes at the Summer Olympics were less impressive post 1988 – the best finish was an 11<sup>th</sup>-place finish in 1992 at Barcelona, Spain.<sup>1</sup> Yet, these successes are more the result of an arms race in spending on sport, in which Canada has taken part at the expense of overall sport participation rates, than the result of adopting the LTAD model (Donnelly, 2009).

There are many models of talent identification and development (see Gulbin, Crose, Morley & Weissensteiner, 2013; Côté & Vierimaa, 2014), with the adoption of a particular model essentially determined by the ability of its supporters to persuade a sport body's decision makers that their model will lead to success – scientific support for any particular development model is simply not available. The questions that I address in this paper concern the dominant role that the long-term athlete development model plays in Canadian coaching circles (CAC, 2012). Is such a role warranted? Should the LTAD model be taught and pursued at the expense of other approaches to coaching? Can the LTAD model with its periods of training and associated windows of opportunity (discussed below) apply equally to all sports? The discussion proceeds to answer these questions by first reviewing the mechanisms of talent development, and then investigating the claims of the LTAD model with the aim of comparing it to more general notions of talent development.

Since Judo Canada has embraced the LTAD model in response to the requirements of the CAC, I also examine how the model is applied to judo in order to shed light on the LTAD model versus other approaches for gaining the podium. My insights come as an active participant in judo for more than 50 years; I have been a competitor (winning many intercollegiate and regional tournaments), instructor, coach and referee in three different countries with some twenty judo clubs, and hold the rank of *godan* (5<sup>th</sup> *dan* or black belt grade). I was a founding member of two judo clubs, and an instructor and coach of college-level and community judo clubs, some of which have had as many as 100 or more members.

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<sup>1</sup> Canada's best finish at a Summer Olympics was a 6<sup>th</sup>-place finish in 1984 at Los Angeles, but these games were marred by the boycott by East Bloc countries.



## Coaching and Talent Development

To what extent is talent or performance a product of genes and to what extent of training? Are athletes born with ability or do they acquire it through hard work? The nature-vs-nurture paradigm is easy to understand, but it is “vague to the point of meaninglessness” (Coyle, 2009, p. 69). In this section, I shed light on this issue by examining the literature from the perspective of psychology and biology. I then relate this to the long-term athlete development model.

### Deliberate Practice and the Ten Thousand Hour Rule

More than others, psychologists have studied pathways to the development of skills and talent (Ericsson, 2006, 2008). Relying on extensive interpretations of the literature (but not empirical data) for their insights, Ericsson, Krampe and Tesch-Romer (1993), and later Ericsson, Roring, Nandagopal (2007b), made the case that performance is based entirely on nurture, with nature playing only a minor role. That is, from a coaching perspective, training in the form of deliberate or highly motivated practice (Ericsson et al., 1993; Ackerman, 2014), can overcome any deficiencies related to innate ability.

Deliberate practice involves full-time coaches who employ highly structured activities that entail “considerable, specific, and sustained efforts to do something [the person] *can’t* do well – or even at all” (Ericsson, Prietula & Cokely, 2007a; emphasis in original). In addition to designing the elements of a training regime, the role of coaches is to encourage athletes to attend to tasks, motivate them to exert effort to improve performance, and provide “immediate informative feedback and knowledge of results of their performance practice” (Ericsson et al., 1993, p. 367). With deliberate practice, subjects’ performances improve as an increasing function of the amount of practice (p. 367).

The skills that are acquired from extended deliberate practice limit “the role of innate (inherited) characteristics to general levels of activity and emotionality” (Ericsson et al., 1993, p. 363). Indeed, with the exception of weight and height, inherited characteristics play no identifiable role as an explanation of performance: “Consistently and overwhelmingly, the evidence showed that *experts are always made, not born*” (Ericsson et al., 2007a; emphasis in original). Even an “acceptance of the importance of innate determinants of motivation would not change our argument that training and deliberate practice are the principal causes of exceptional performance” (Ericsson et al., 2007b, p. 33).

In this discussion, no mention is made of financial incentives as a motivating force behind deliberate practice; rather, athletes are driven to deliberate practice by a desire to win, personal satisfaction, coaching, and so on.

According to Ericsson et al. (1993), “elite performance [is] the product of a decade or more of maximal efforts to improve performance in a domain through an optimal distribution of deliberate practice” (p.400; see also Ericsson et al., 2007b). This was subsequently popularized by Gladwell (2008), who referred to it as the 10,000-hour (10-year) rule, “which says that world-class expertise in every domain ... requires roughly a decade of committed practice ... from which no one is exempt” (Coyle, 2009, pp. 51-52). Assuming this rule holds, it is a simple matter to determine the age at which one should begin music lessons, training for a particular sport, or the development of any other skill. All one has to do is consider the age at which people become world-class experts and subtract ten or so years. As a rough guide, this suggests that a world-class female gymnast would have had to start at age 5 or 6, a male gymnast perhaps a bit later, a tennis player sometime between ages 7 and 9, and a judoka no later than age 13 (see below). World-class athletes were engaged in deliberate practice at a time “when most children and adolescents of similar ages engage in play and leisure” (Ericsson et al., 1993, p. 400).

### **Talent Development: Biology and Economics**

As discussed above, genes are thought to play little or no discernable role in the determination of elite performance. What then is the role of biological factors? Without going into detail, consider some basic biology that relates to talent development.

There is evidence that the process of acquiring skills produces white matter in the central nervous system known as myelin (Fields, 2005, 2008). Glial cells in the central nervous system function to support and protect neurons, which they do by producing myelin. Neurons in one region are connected to neurons in another region via neural axons. Unless axons are wrapped in myelin, they leak information, with the leakage inversely proportional to the degree of wrapping. “Long axons insulated with myelin carry signals between neurons faster than unmyelinated axons” (Fields, 2008, p. 58); these signals move faster as the wrapping of myelin increases. Certain glial cells known as astrocytes ensure that information from several sources or stimuli arrive at their destination neurons simultaneously for peak performance. At certain places along the myelinated axons, there appear un-myelinated breaks referred to as nodes of Ranvier that relay impulses along the axons. At the nodes, “the impulse is strengthened and volleyed from node to node” (Fields, 2008, p. 59).

Myelin and its purpose were discovered as a result of a new imaging technology, known as diffusion tensor imaging (DTI). Myelination is important for talent and athlete development because “skill is insulation that wraps neural circuits and grows according to certain signals” (Coyle, 2009, p. 73). The importance of myelin (white matter) to performance was documented in the case of reading, where DTI was used to measure differences in myelin in children (Myers et al., 2014). It appears that, as long as one engages in certain activities (depending on the talent one develops), myelin keeps being laid regardless of one’s age, with some eventually

needed to replace that which deteriorates. Importantly, wrappings of myelin are thought to increase to perhaps age 50, after which losses can be mitigated by continuous stimulus (including practice). Certain activities build more myelin and at a faster rate than other activities. From an athlete's point of view, which activities are better at myelination? Deliberate practice (DP) is one activity that provides signals that build myelin, but DP is not only the only such activity and may not even be the best one.<sup>2</sup> Myelination occurs with many different types of activities, and also with psychological stimuli.

Since DP promotes myelination, this provides support for the notion that innate abilities may have little impact on elite performance. This conclusion only holds if deliberate practice is the primary and best way to increase myelination of the sort that enhances performance. Biology does not currently permit us to make such a conclusion. Pickup games of pond hockey (Canada), futebol (Brazil) and basketball (U.S. inner cities) may be better suited to the development of elite hockey, soccer and basketball players than deliberate practice of these sports beginning at a young age. Psychological stimuli, the desire 'to escape the ghetto', et cetera, interact in important ways with these sorts of activities in promoting myelination.

In many sports, competition is likely more important to an athlete's development and performance than deliberate practice and other activities. Based on athletes' ratings of their training activities, it turns out that "time spent in competition was the most valuable training activity for developing essential elements of performance (i.e., perceptual/cognitive abilities and physical fitness" (Baker & Young, 2015, p.147).

The Nobel Laureate Daniel Kahneman (2011) distinguishes between 'system 1' and 'system 2' responses to situations in which people find themselves. System 1 responses are fast, intuitive, emotional responses that are automatic, whereas 'system 2' responses require the person to be deliberate, to think about how to respond to whatever difficulty they might encounter – the types of situations that a person cannot do or do only with great difficulty. Kahneman characterizes system 2 as being slower simply because it requires conscious attention, but the challenges that trigger a system 2 response result in a quick and effective building of myelin wrapped neural exons. What training activities do a better job of myelination?

Deliberate practice can sometimes be too routine, even boring, unless ways can be devised to engage 'system 2' during the practice. Is it possible to devise situations that the athlete cannot do or do only with great difficulty? It would seem that competition and friendly pick-up games are better suited for placing participants in unfamiliar situations that require them to be

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<sup>2</sup> Deliberate practice "refers to activities that require cognitive or physical effort, do not lead to immediate person, social or financial rewards, and are done with the purpose of improving performance" (Baker & Young, 2015, p.135). See also Ackerman (2014) for an excellent critique of the concept of deliberate practice and the LTAD model more generally.

deliberate and think about how to respond. The reason is that a 'system 1' response is usually needed, and such a response might only be forthcoming after the athlete has experienced failure, perhaps more than once. Once an appropriate response has been devised, 'system 1' will take over – the needed myelin will have been laid down.

Of course, coaches could devise situations similar to those one might encounter in competition and train the athlete to respond. Videos of competitions and training sessions are generally helpful, and discussion of strategies and repetition of responsive actions could be used in lieu of actual competition in some cases (say, to reduce risk of injury). Without empirical evidence, it is impossible to conclude whether deliberate practice or competition (or the closest form of training equivalent to competition) is the preferred approach to prepare athletes.

The only evidence in favor of competition comes from comparing countries' spending on sport. As noted earlier, countries that spend more on athletes are also more successful in reaching the podium (Donnelly, 2009). It costs money to train athletes and send them to competitions, particularly international competitions. Research indicates it might cost upwards of \$30,000 per year to develop an elite adolescent hockey player (Baker & Young, 2015, p.136), although elite adolescent hockey players are more likely to make it into the professional ranks where such costs are a pittance compared to potential annual earnings.<sup>3</sup> Elite athletes in sports that offer no similar rewards generally incur a high opportunity cost to participating; they might delay graduation from college or forgo college entirely and forgo income (and possibly a career) in pursuit of the podium, while running a risk that a sport-ending injury will prevent them from attaining their sporting goals. Therefore, countries generally need to provide some form of remuneration to athletes in sports that are not already professional. As a consequence, amateur sport has now been thoroughly professionalized in many countries despite insistence to the contrary by many international and national sport bodies.

My hypothesis is that a country's funding of sport, whether from the public purse or from private donations, or both, is the most powerful factor determining Olympic success. As a corollary, I postulate that the type of talent identification or athlete development model that a country employs has little if any impact on sporting success once controlled for spending on

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<sup>3</sup> For other sports, such as figure skating where ice rental and a coach need to be paid, costs might be higher. Based on the author's own experience, the training costs for an elite adolescence judoka are much lower, but could still run over \$10,000 annually if one counts several partially subsidized national and international level competitions.

sport and good governance (i.e., lack of corruption, rule of law, etc.).<sup>4</sup> These are testable hypotheses that future research needs to address.

### **Empirical Evidence for Deliberate Practice and Performance**

A practical approach to developing talent based on the theory that innate abilities have little if anything to do with elite performance will look much different from one that takes greater account of hereditary factors and innate abilities. If innate factors are important, sports organizations and coaches will spend more time identifying candidates with a genetic proclivity for attributes important to a specific sport while weeding out contenders not possessing those innate abilities (as the Soviet Union and East Germany did after WWII). If a decade or more of deliberate practice is not needed to develop elite talent (Güllich, 2014; Baker & Young, 2015), then an emphasis on recruitment of very young athletes to the exclusion of somewhat older ones might also be misguided.

The notion that innate ability plays almost no role in elite performance is based almost entirely on a particular interpretation of the literature and not on statistical evidence per se. One conclusion that can be tested relates to the importance of deliberate practice versus other factors, and the idea that it takes some 10,000 hours of deliberate practice to become a world-class expert. It has been shown that motivation apart from practice is an important factor in the development of talent. A longitudinal study by McPherson and Renwick (2001), which followed 157 children in a music program over a period of three years, found that accumulated practice of a musical instrument explained only “between 9 and 32 percent of the variance in their scores on the Perform Rehearsed Music measure” (McPherson, 2005, p. 27). Compared to practice, acceptance by one’s peers and a positive attitude were found to be more important in predicting differences in eventual musical performance, *ceteris paribus*.

Ackerman (2014) provides examples of elite athletes in a sport who began late and reached the podium in less than one year. The late Wim Ruska began learning judo at age 20 and won gold medals 12 years later in both the 93+ kg and open weight categories at the 1972 Munich Olympics. Güllich (2014) found that few players on Germany’s field hockey team that won gold at the 2012 London Olympics had come even close to 10,000 hours of practice, even when training hours in other somewhat related sports were included.

In a study of 10,500 Swedish twins, Mosing, Madison, Pedersen, Kuja-Halkola and Ullén (2014)

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<sup>4</sup> Economists and political scientists have demonstrated that good governance is crucial to successful economic development (e.g., see Pendergast et al., 2011) and that this carries over to sport. For example, if corruption is high in a given country, this implies that less money designated to support athletes actually gets to them.

discovered that 40 to 70 percent of musicality was substantially inheritable. Indeed, “once all genetic and shared environmental factors were controlled for, the association between music practice and ability disappeared – in other words, the twin who trained more did not possess better music abilities” (p.1800).

A more important result from a statistical perspective comes from a meta-analysis by Macnamara, Hambrick and Oswald (2014). These authors screened 9,331 abstracts and 3,013 full-text articles for eligibility, but retained only 88 studies that provided sufficient data linking practice and performance. Of the 157 effect sizes in these studies, including 60 in the area of sports of which 28 focused on individual sports, Macnamara et al. (2014) found that deliberate practice explained at most only 26% of the variance in performance. For individual sports, only 19% of the variance in performance was accounted for by deliberate practice, and it was somewhat less for all sports taken together. The conclusion is that, although deliberate practice is important, it can only account for a small part of world-class athlete performance. Certainly, it would be premature to build a model of talent identification and development on the notion that athletic success does not depend on innate abilities and that a decade of deliberate practice will bring Olympic medals if a sport’s coaches implement a particular, standardized formula based on deliberate practice.

### **Long-Term Athlete Development Model**

The long-term athlete development model of Istvan Balyi and his colleagues (Balyi, 1990, 2001; Balyi & Hamilton, 2004; Bayli et al., 2013) has been adopted by the governments of the United Kingdom, Ireland, Canada and several others, perhaps because it is easy to understand albeit difficult for coaches to implement (McKeown & Ball, 2013). In an early paper, Balyi (1990) discusses the idea of periodization for athlete development, arguing “that long-range planning of athletic performance was a pre-condition to the achievement of international sporting success” by the Soviet Union and East Germany. Periodization in the sense used by Bayli refers to the quadrennial and double quadrennial – the four and eight years – required for athletes to win Olympic medals. The idea of periodization is now used “to describe any form of training plan” (Kiely, 2012, p.242) where the activity set is changed periodically. The point here is simply this: From its outset the LTAD model was clearly aimed at producing Olympic results.

Balyi subsequently refined his LTAD model by basing it squarely on the works of Ericsson, because this provided the justification for ignoring genetic predisposition and focusing solely on practice, particularly the idea of deliberate practice and Ericsson’s 10-year or 10,000-hour rule (Ericsson et al., 1993), which was subsequently popularized by Gladwell (2008). Thus Balyi begins his two most-cited articles (Balyi, 2001; Bayli & Hamilton, 2004) by quoting the Nobel

Laureate Herbert Simon: “It takes 10 years of extensive training to excel in anything.”<sup>5</sup>

The LTAD model now dominates Canada’s coaching landscape, partly because it presumes that athletic success is not innate but can be trained. The LTAD training program distinguishes seven phases of development according to the age and gender of a child: (1) ‘Active Start’ (ages 0 to 6); (2) ‘FUNdamentals’ (ages 6 to 9 for boys, 6 to 8 for girls); (3) ‘Learn to train’, denoted LT (ages 9-12, 8-11); (4) ‘Train to train’ (12-16, 11-15); (5) ‘Train to compete’ (16-23, 15-21); (6) ‘Train to win’ (age 19+ for boys and 18+ for girls); and (7) ‘Active for life’ (any age) (Canadian Sport for Life, 2015; CAC, 2012). The phases provide an appealing approach for developing an athlete from a young age to success on the international stage.

The LTAD model has recently been the object of severe critique, however (e.g., (Ackerman, 2014; Alfonso, 2014; Côté & Vierimaa, 2014; Kiely, 2012). Contrary to its claim, the LTAD model is not based on scientific research and periodization is not a scientific pathway. As Ford et al. (2011) point out: “there is a distinct lack of empirical data to support such a long-term periodized model” (p. 390).

The model fails to distinguish between chronological age and development age. Physical and mental development of children varies widely and depends on socioeconomic factors as well as innate ones (see Tough, 2012); the ability of children to perform certain physical tasks (or understand particular abstract concepts) is not dependent solely on their age. While there is no doubt that exposure to a sport at an early age bestows a later advantage (although evidence is based on observations of those surviving to the competitive stage, who have self-selected for the sport), but this does not preclude a late starter from becoming an expert or elite athlete. For example, the Dutch judoka, Wim Ruska, who began judo at age 20, won gold medals at the 1972 Munich Olympics in both the +93kg and open divisions at age 32 (see also Ackerman, 2014).

The LTAD model focuses exclusively on youth; this is particularly evident with respect to its so-called ‘windows of opportunity’ or ‘windows of trainability’ (Canadian Sport for Life, 2015, p. 32). These ‘windows’ are considered to be crucial in the ‘Training to train’ phase when peak height velocity (PHV) occurs (Canadian Sport for Life, 2015, p. 5). There are also critical periods for development of certain aspects of motor performance, such as speed, strength, endurance or technique, that open for a period and then close. If a window for developing a particular skill is missed, and the stimulus for training that skill is not provided, the athlete will never achieve the peak potential in that aspect. Coaches are told to be sensitive to PHV, which occurs just

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<sup>5</sup> Simon never made this statement, as a search of the internet indicates; see, for example, [https://en.wikiquote.org/wiki/Herbert\\_A.\\_Simon](https://en.wikiquote.org/wiki/Herbert_A._Simon) [accessed August 18, 2015].

before age 12 in girls and 14 for boys, because this opens a window of trainability that cannot be missed – there are no shortcuts with the LTAD approach. Consider the following:

- Ford et al. (2011) conclude that, “until more comprehensive consistent evidence is available, it is *inappropriate* to state that *young* participants should only train aerobic fitness during prescribed ‘windows of opportunity’” (p. 394, emphasis added). They found no evidence that there exist windows of opportunity related to speed or strength. A meta-analysis by Macnamara et al. (2014) does not support the notion that there exist windows of trainability.
- One of the major errors that scientists make is to confound causality – incorrectly attributing an outcome to a cause while ignoring or downplaying the underlying variable that is the true cause. Ford et al. (2011) argue that increases in speed at the time of PHV are likely attributable to increased lower limb length, a physiological attribute that is not trainable. Likewise, while some evidence suggests that gains in strength occur during the ‘Training to train’ stage, these are correlated with the buildup of muscle and other mass, not related to PHV. Gains in body mass are not trainable and depend on genetics.
- The very notion that there are windows of opportunity suggests that these open and then close. However, there is no evidence that windows do indeed close, and they may well remain open well into adulthood, as the example of Ruska illustrates.
- The LTAD model provides no guidance as to how training should change or be adapted to take advantage of a window of opportunity. The coach is only told that there exist such windows, that it is important to take advantage of them, and that PHV is an important indicator to use in determining when training should change.

In conclusion, “the proposition that if young participants do not utilize these ‘windows of opportunity’ they will never reach maximum athletic [performance] is unjustified” (Ford et al. 2011, p. 398). Little wonder that “caution is urged to ensure that the model does not become too enshrined as ‘fact’” (p. 390), while sports organizations are warned against adopting a model for developing athletes that is a “commercially driven” (Gulbin et al., 2013, p. 1320). As Collins and Bailey (2013) argue, sports bodies often uncritically accept the scientific claims of talent development models without evaluating such claims, often at great cost. For example, prior to adopting the LTAD model, the UK relied on the Talent Search model, but a £43,000 analysis of Talent Search resulted in its abandonment after it had already cost the UK more than £ 1 million.

### **Applying the LTAD Model: A Judo Coach’s Perspective**

On the international stage, Canadian judoka have booked limited success (two silver and three bronze Olympic medals between 1964 and 2012), with 36 years separating the silver medals by Doug Rogers (1964) and Nicholas Gill (2000). Overall, Canada’s performances in judo rank it 32<sup>nd</sup>



on the world stage (Wikipedia, 2015b). Clearly, there is room for improvement and coaching has a role to play. How does the LTAD model relate to the coaching of judo?

It takes about 15 hours to read Judo Canada's instructors' reference manual (Judo Canada NCCP Committee, 2010; hereafter 'Manual') and the three age-specific coaching manuals that accompany it (Judo Canada, n.d.(a), n.d.(b), n.d.(c); hereafter 'U7', 'U9' and 'LT', respectively). As a package, this material is meant to facilitate adoption of LTAD by judo coaches, but sections within the Manual, and information between the Manual and the age-level documents, are often contradictory. The reason likely pertains to the incompatibility between the judo pedagogy or mindset that one finds in judo and the pedagogy underlying the LTAD model.

Since the Japanese educator Dr. Jigoro Kano founded judo in 1882, judo pedagogy has been tightly bound to its roots. Indeed, the 'bible' of judo remains *Kodokan Judo* (Kano, 2013). The first edition of the book was edited by Kano's former students and followers, and published in 1956 by the Kodokan, the world headquarters of judo in Tokyo. Due to high demand for the original text, a revised version was written by an editorial team of 21 high-ranking Japanese judoka (which included five women) and published in 2013 (see Kano, 2013, pp.11-12). The revised textbook is similar in content to the original; it provides the techniques practitioners are required to know in order to advance in judo (see below).

Methods used to develop judo athletes remain similar to those that characterized the sport some 100 years ago. These include instruction in the fine points of grappling (*katami waza*) and throwing (*nage waza*), and methods of entering into throws – *kuzushi* (breaking balance), *tsukuri* (positioning or fitting in to throw) and *kake* (execution), with judo players regularly attending clinics where international level competitors and coaches teach newer/alternate ways to apply the techniques. However, *Kodokan Judo* considers only two types of training relevant for judo – *kata* (forms) and *randori* (free practice) (Kano, 2013, pp.21-22). *Kata* entails the practice of pre-arranged formal techniques, while *randori* simulates actual competition as closely as possible.

Clearly, there are various forms of training employed by instructors/coaches. Some spend much of the practice time teaching grappling or throwing techniques. Alongside, it is necessary to teach methods of defending and countering attacks, and escaping from hold downs. Endless repetition (known as *uchikomi*) is often used as a form of deliberate practice to train the body to execute throws or counter attacks spontaneously (without thinking), even though *uchikomi* is not even mentioned in the *Kodokan Judo* text. Other instructors rely almost exclusively on *randori*, which is more along the lines of 'pickup' basketball or hockey. Yet others spend more time replicating possible competitive situations (e.g., one player attacks, the opponent only defends; one applies a hold, the other has 25 seconds to escape). While the LTAD approach recommends what activities to accentuate and how much time to spend, this advice is universally ignored. Instructors use practice times, and allocate time to instruction and other

activities, in ways that they find most suitable to their participants (recreation vs competitive, age and gender mix, etc.).

Aerobic and anaerobic (weight) training occur outside regular judo practice, often without the supervision of a coach although supervised training is considered to be beneficial (Harrington, 1992, p. 86). Some grassroots judo coaches offer and supervise off-the-mat training, but most do not. Judo Canada's various manuals (Manual, U7, U9 and LT) provide little guidance in this area of coaching; coaches can access all kinds of training guides, specific to judo or otherwise (e.g., Ishikawa & Draeger, 1999), but most do not, leaving this component of training to the individual athletes. The same is true when it comes to training records that monitor athletes' progress and help identify weaknesses. Many judo coaches at the international level likely track and implement such aspects, but guidance concerning scientific weight training, record keeping, et cetera, is pretty well absent in Judo Canada's LTAD materials.

Judo instruction appears to have changed little as a result of the LTAD program. Based on the revised edition of *Kodokan Judo* and how practices are conducted in many judo clubs, coaching and instruction in Canada remain much as they have been in the past. In addition to the points discussed above, one other impediment to the adoption of the LTAD pedagogy is judo's grading syllabus and requirements for *dan* promotion – promotion to black belt and the various *dan* grades therein are set by the Kodokan, and have changed little over the past half century or more. While competitive success enables one to move through the colored belts (white, yellow, orange, green, blue and then brown) to black belt, and then through the *dans* within black belt, much faster than would otherwise be the case, success as a competitor is not a prerequisite for promotion. Indeed, elite judoka often fail to get promoted to higher ranks in timely fashion because their focus is on competition and not on the nuances of promotion (e.g., tests of various types of *kata*). As a result, the elite athlete often finds herself several *dan* levels below judoka who competed little but took care to follow the technical requirements for promotion. Given that the higher rank is given precedence in instruction/coaching, and that it could take the elite judoka many years to 'catch up', this system becomes an impediment to the implementation of a coaching program at the grassroots.

The pedagogies of the NCCP and judo diverge in two other important ways – the first relates to the LTAD model's windows of trainability and the second to judo-specific culture.

### **Windows of Trainability and the Emphasis on Children**

There remains debate about the age that children should start judo. The usual consensus had been before age 9, although one could start judo at any age. The advantages of starting young are obvious (e.g., Baker & Young, 2015), although the associated costs "can be devastating for a large number of youth ... [as] early specialization leads to less enjoyment in sport and more dropout, burnout, and injuries" (Côté & Vierimaa, 2014, p.565). Yet, in its efforts to implement

the LTAD model, Judo Canada appears to have pushed the starting age lower while all but ignoring late comers.

The NCCP coaching program for judo sends mixed messages regarding both age of first exposure and how training should proceed. For participants under age 12, the coaching manual is clear: it is necessary to avoid “specialization in a sport”, “negative competitive experiences” and “comparisons with other children”, while “all activities should take the form of games” (Manual, pp. 48, 50, 53, 56, 58). Later, the following is offered: “With young athletes, general and specific exercises should be used most of the time, not competition exercises” (Manual, p. 103). Thus, the Manual promotes judo specific activities only after age 7, and limited competition only after age 10. It is surprising, therefore, to find that, in the U7 and U9 manuals, specific judo exercises and “hip and shoulder throws, sweeps, etc.” (U7, p. 6) and “in club competition” (p. 9) and standing *randori* (p. 16) are promoted as proper activities. In practice, however, competition is restricted to grappling only for U9, but inter-club tournaments have replaced in club competitions.

While early exposure to judo is unlikely to be harmful, the ‘Learning to train’ manual states at the outset that “... U13 is the best time for children to start judo. ... [O]ver 88% of medal winners at the Olympic Games and World Championships, started judo at the age of 11 or later” (LT, p. ii). Yet the advice to prospective coaches regarding younger children contradicts this: U9 is a crucial time because the first window of opportunity “occurs around the 7<sup>th</sup> year of life for females and 8<sup>th</sup> year of life for males” and missing it “may result in an individual never being able to accomplish his/her own personal best” (U9, p. 4). Even if unintended, the message is clear: prospective judoka need to be taught certain skills by age 9 or the opportunity is lost forever. How does one account for the fact that most successful judoka (recall Wim Ruska) start at age 11 or later? After all, both propositions cannot both be correct.

Judo Canada (LT, p. 10) recommends that judoka under the age of 11 should practice 2-3 times per week for 60-90 minutes and ‘compete’ in four competitions per year; those under age 13 are to practice 3-4 times per week for 60-90 minutes and participate in up to six tournaments (20-25 bouts) annually. Again, this goes against recommendations regarding competitions that appear in the Manual (and even Balyi, 2001, p. 2), where coaches are continually told to avoid “negative competitive experiences” and “comparisons with other children” (p. 58). The coaching material goes even further, specifically warning against the use of elimination camps or other means that exclude athletes from achieving their goals, particularly at a young age. The Manual (p. 96) specifically makes this point twice, indicating the importance of this concept: “Don’t conduct selection camps that result in the elimination or exclusion of athletes” and “Don’t conduct trials that result in the elimination or exclusion of athletes.”

Importantly, judo instructors wishing to be certified as NCCP coaches are evaluated solely on the basis of their ability to conduct a children’s judo practice. This is true even for proven

college-level coaches who have never taught children below the age of 16. A program based on the LTAD and its windows of opportunity clearly has little to offer coaches whose athletes start judo in college or later in life.

### **Judo Culture**

As noted above, there is debate about how much time to allocate to teaching, how many techniques to focus on in a given practice, and how to allocate practice time to *nage waza* versus *katame waza*. There is debate about static versus moving *uchikomi*, and the role of *randori*. These issues are not easily resolved, primarily because answers differ across nations and regions.

Japan has many more judoka per capita than other countries. During *randori* many more partners are encountered than elsewhere, thereby providing more situations that might be encountered in an actual competition and more situations requiring a system-2 type of response that leads to greater wrapping of myelin. Thus, Japanese judo relies on high-intensity *randori* to a greater extent than elsewhere, with coaches intervening during *randori* to correct or advise individual athletes. Despite judo's internationalization beginning in the 1930s, Japan continues to be the most successful country in international competitions and Olympics by a wide margin (Wikipedia, 2015b), perhaps because of its on-the-mat methods of practice and coaching.

The Japanese model is less successful elsewhere. In other countries, and particularly in North America, judo training might involve much less *randori*. Importantly, one has fewer training partners and, thus, reduced opportunities to be placed in new, stressful situations important for simulating competition. *Randori* is less effective and easily becomes stale as training partners know each other too well. Hence, coaches need to rely more on training that simulates attacks and defenses, how to escape hold-downs, and the repetition of counter attacks and combinations, all of which a Japanese fighter is more likely to encounter during *randori*.

That there are many approaches to training is a function not only of coaching ability, but also of culture and location. For example, coaches in some countries can strike judoka (e.g., with a bamboo stick) if they appear to be shirking, but this would be forbidden elsewhere. The black belt test for women requires the demonstration of more knowledge than that for men; even though discrimination is not permitted in western countries, it is nonetheless tolerated as the grading standards are set by the Kodokan. Cultural differences are important for a sport such as judo, which gets little publicity and little press coverage in countries of North America but is well known in many European countries. Coaching takes on a different role when the society at large is familiar with a sport's practices, unique disciplines, potential dangers, expectations and other nuances than when there is no knowledge of what it entails. Coaches need to understand these cultural differences, educating parents and sports bodies such as the CAC that judo is not

the same as ice hockey, soccer, swimming or other sports that dominate the culture. While this has little to do with models of athlete development, it has everything to do with coaching.

### **Some Recommendations for Coach Education**

The NCCP was developed to improve Canada's coaching competency. As part of this program, Judo Canada required instructors to be certified as a 'Dojo Assistant' (DA) at minimum, with head instructors (club *sensei*) to be certified as a 'Dojo Instructor' (DI) – these were former NCCP levels I and II. To incentivize instructors to become certified, each club is required to have a DI on the mat at all times to be eligible for liability insurance through Judo Canada.

Interestingly, there is no need to have someone with first-aid training on-site, nor do coaching certification programs provide first-aid training. From a liability standpoint, first aid training is much more important; while a trained coach can do certain things to reduce the chances of injury, there will always be injuries because judo is a contact sport where the application of any grappling or throwing technique, whether pre-arranged or the result of free practice (and thus unpredictable), could lead to injury, including severe injury.

As a further incentive for individuals to become certified, Judo Canada awards technical points toward promotion to higher *dan* grades upon certification, with additional points earned each year that the 'coach' is active at the level for which they are certified (with higher points awarded for DI over DA certification in both instances). The promotion criteria permit only the head instructor (*sensei*) to earn technical DI points, while DA points are earned only when the 'assistant' instructor is active in that capacity for a minimum number of hours per year. In practice, however, everyone who is DA or DI certified earns the associated technical points, even those who are not head instructors/coaches or even active in judo. Further, requirements to retain certification are often overlooked. Clearly, the incentives are completely out of whack, encouraging the weakest judoka to be certified as coaches. This incentive system needs to be eliminated or strictly monitored and enforced.

It is also necessary to revamp the coaching material used in the DA and DI courses to remove inconsistencies and improve the quality of presentation. All of the material currently found in various disparate manuals needs to be collected in one document that is consistent throughout. The theory and practice sections need to be more clearly delineated, and, importantly, need to relate to each other.

The coaching of judo needs to be professionalized. National and provincial level coaches should be accredited by a Canadian university with an accredited graduate-level coaching program. Former elite judo athletes who have at least an undergraduate degree should be incentivized to some graduate-level training for coaches. An atmosphere of academic study of judo coaching needs to be developed in Canada.

Finally, each year judoka across the country are registered with Judo Canada through the

provincial associations. These records need to be better maintained and should include information that would be helpful to provincial and national coaches who need to identify and track the progress of athletes, some of whom they may not even be familiar. Research pertaining to registered judoka should be ongoing at all levels to determine factors related both to participation and performance. 'Exit' surveys are needed of judoka who have had some success at the provincial level, but subsequently dropped out of competition for no apparent reason (e.g., before reaching age 22, say). Exit surveys are useful for improving retention rates and coaching effectiveness. Records should be kept of injuries (within clubs and at tournaments) to identify patterns and rectify potential problems. Records should be used to track competitors from the time they first compete and as they remain competitive. Likewise, records of grass-root coaches should be maintained and updated annually. This helps to identify where to focus administrative, coaching and other resources to ensure success at the national and international levels, and to improve delivery of judo recreation services to the community.

Finally, judo should be part of the physical education curriculum beginning with grade 6. Judo provides useful skills related to body movement and proper ways to fall, which has the potential to reduce injuries related to unanticipated falls late in life. In addition, the physical fitness benefits and, importantly, the abilities to fall properly (thereby reducing injury later in life). In addition, judo enables boys and girls to interact physically in combative situations, which teaches respect for and an appreciation of the opposite gender. Indeed, judo has a long history of boys and girls competing against each other until the age of puberty. Even now, the best training partners for elite female athletes are young men between 17 and 19 who are of brown belt or *shodan* (1<sup>st</sup> degree black belt) rank. Of course, there are also physical fitness benefits.

### **Concluding Observations**

Economists use the term 'policy failure' to refer to situations where governments intervene to correct a 'market failure' (e.g., pollution, bank crisis), but in so doing actually make the situation worse. Likewise, 'coaching failure' can occur when a forced change of an existing coaching pedagogy leads to no improvement in outcomes and might even worsen them. While it is not clear that the LTAD approach applied to judo led to improved outcomes on the international stage, it does appear that it has resulted in significant disruption to judo pedagogy, much of which might be considered harmful.

The current coaching program has nothing of substance to offer coaches who teach recreational judo, and raises more questions than it answers for instructors dealing with mixed classes consisting of experienced youth (15-20), inexperienced young adults who still wish to compete, and older adults who are interested in recreation. The result is the mix of approaches that is not guided by the LTAD approach, but, rather, one that implicitly or explicitly relies on *Kodokan Judo* as its guide. It is certainly not a coaching model rooted in the LTAD model with its ultimate aim

of producing elite athletes.

The LTAD model assumes that nurture trumps nature – that training is more important than innate ability. It then proposes a standardized program to train athletes to overcome genetic predispositions; however, it is innovation and not standardization that is the most important route to success and should be promoted (Alfonso, 2014). The role of the coach is to encourage innovation, motivate and teach the athlete not to overcome their innate talents but to train that genetic advantage to achieve their best.

Finally, financial incentives should not be ignored. Large injections of funds have turned today's athletes into full-time professionals, who travel the globe to compete in regularly-scheduled sporting events, retaining their funding only if they succeed internationally. The amateur can no longer compete at this level. This is certainly the case in the judo world. One might therefore ask: Is it necessary for a country to have a model of talent development? Would it not be better to leave coaching decisions to the individual sporting organizations in competition for funds that are allocated on the basis of a combination of participation (general health benefits) and international success? In that case, judo might well decide to focus less on the development of elite athletes and invest more in developing judo participation for its physical health benefits, as Dr. Kano the educator originally envisioned.

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