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Original Article

The Distal Method: from psychomotor education to motor expertise

KONSTANTINOS G. PAPAGEORGIOU
Ionian University, BIHE Lab of Bioinformatics, Department of Informatics, Corfu, GREECE
University of Athens, Applied Philosophy Lab, GREECE

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Abstract:
A unifying theoretical model for motor expertise attainment is presented. Based on an extensive theoretical background, several practical applications are discussed, examples are given, and guidelines are proposed. The main tenets of this approach, called "The Distal Method" is that motor expertise development should be based on i. processes that impact the future and not (necessarily) the present, ii. motor skills and cognitive skills are coupled iii. emotions are the substrate for any development to take place. The basic tools of such an approach will be presented here, which could act both as a guide and a model – or even a paradigm – for successfully developing and refining psychomotor skills from early on.
Key words: Motor expertise, education, contextual interference, tactics, technique, drama pedagogy.

Introduction

Educational and training systems focus on certain perspectives, such as playing, associating technique and tactics, grouping similar skills etc. Collectively, many such approaches are referred to as the *Teaching Games for Understanding and Situated Learning* approach – or any of its modifications (Almond, 2015; Bunker & Thorpe, 1982; Holt, Strean, & Bengoechea, 2002; Kirk & MacPhail, 2002). Much as I agree with this approach, the aim here is to present a more holistic model, sensitive to theories from the domains of expertise, motor learning, sports psychology, applied ethics, theatre pedagogy, situated learning and epistemology. An outline of its constituents and of its applications is sketched, and the various stages of the model, as well as its rationale are presented. I argue in favour of a more cognitive approach even in sports to develop a better program that could lead to better learning of motor-skills and sequences.

1. Motor expertise in perspective

Victory is the obvious outcome of a successful method for expertise attainment. However, victory is the *result* of expertise, not its *cause*, and to claim otherwise is a logical fallacy.

As Schmidt & Wrisberg (2008) point out, someone is "rightfully" an expert when they can demonstrate proficiency while performing in real *and* changing conditions This notion is condensed in Ericsson's definition (or criterion) for experts, influenced by De Groots' early work with chess players: "An expert is expected to be able to demonstrate *superior, reproducible, representative* performance" (K. A. Ericsson, Nandagopal, & Roring, 2009, p. 202). *Sport expertise* has been defined as the "consistent superior athletic performance over an extended period of time" (Janelle & Hillman, 2003).

Almost all of us, in various occasions, are able to satisfy some of the aforementioned criteria, but not all in concert. Every amateur golfer has hit a superior drive, but she cannot hit it reproducibly well, on demand, under any circumstances. Everyone can wash dishes reproducibly well, but that is not a kind of performance representative of any "significant" domain of expertise. An expert, though, is both expected *and* required to be able to perform anywhere, under the effect of any conceivable inconvenience, at world-class level and in a recognized domain, such as chess or tennis.

Both "superior" and "representative" are value judgments. One may indeed measure how far someone threw a javelin (and compare distances) or hit a backhand winner. However, which one of these physical attributes is to be perceived as "superior" or "representative" of some recognized (by whom?) domain is not at all objective. This is the essence of the methodology adopted here: do not make evaluations based on the outcome but, rather, based on *a priori*[1] internally consistent criteria. This is how our model will be articulated: based on a series of theoretical assumptions.

Who *is* a better player? One adopting consistent hitting patterns, or one being aggressive at the cost of more mistakes? Assuming both are equally successful, do we have any systemic criterion to judge who is a "better" expert? Yes, we do: *creative performance*.

[1] Set beforehand

Corresponding Author: KONSTANTINOS G. PAPAGEORGIOU, E-mail: cconstantinoss@gmail.com

Expertise definitions may exclude creative performance (D. K. Simonton, 2010; D. K. Simonton, 2014): “Creative thought is defined as the process or set of processes that generate ideas that are both (a) original, novel, or surprising and (c) useful or adaptive.” (Simonton 2010 p.159). What is important for expertise, Simonton (2014) argues, is reproducibility, not originality – a basketball star scoring free throws one after another is treated quite differently than a poet who repeats himself. Should e.g. tennis players be creative or consistent? Or maybe both?!

The Expert Performance Approach (K. A. Ericsson, 2006) may accommodate such irregularities if the following assumptions are adopted: firstly, both an expert and a creative performer must have – by default – an internal consistency. Otherwise, any unskilled person (or animal, as is the tendency lately) could e.g. draw random lines and present them as modern art. Secondly, as Ochse notices, the most important distinguishing characteristic of creative producers is the desire and proven ability to work hard (“pull and push”) at their chosen profession – nothing less than what seems to be the most distinguishing characteristics of experts as well (Ochse, 1990, p. 159). The deliberate practice model has implication for both experts *and* creative individuals. Expert tennis players should be creative *while* being able to hit consistently – even though there are successful players who are more creative, or more consistent. Creativity increases *bits of information* (BOI) – the number of questions that must be asked in order to accurately predict an event (Cox, 1994, p. 61). Note that the mere fact that the opponent is less predictable, makes us respond *slower* (Hick’s law[2]). How could we develop such creative players? Based on BOI, as well as on concepts from motor learning and basic epistemology, we shall see how novel ideas, such as *motowords*, *theatrical learning*, *differentiated learning* and *differentiated self-learning*, will help us implement a *continuum* of learning strategies in order to develop creative players of every age till the point of motor expertise.

The basic constituents of expertise are technique, tactics and strategy:

Technique is the way we perform a *single* action; many such actions realize tactics. *Tactics* is the order of the actions; many such tactics realize a strategy. *Strategy* is the general orientation of actions that realize one or more purposes. *Purpose* is an abstract-structural concept referring to the general ideas, reasons, and inclinations in one’s life.

Notes:

1. We could understand technique as *simplified tactics* and tactics as *applied technique*. Each technical choice affects the next one. In other words, *there is a continuum between tactics and technique*, and any technical or tactical model should uncover this relation.
2. Technique does not always include body *motion*: for example, there are techniques for meditation or memorizing.
3. Bad technique is technique too!

Moreover:

- Technique without tactics is meaningless / disoriented / out-of-context. Tactics without technique is non-existent. The same goes for all pairs (tactics-strategy, strategy-purpose).
- Specific tactics may be realized by many techniques; however, any *one* technique does not reveal which one tactic it realized. The same goes for all pairs (tactics-strategy, strategy-purpose).
- Tactical choices of any kind cannot reveal the person’s general strategy – let alone purpose (like before, it’s a many-to-one relation).
- For learning activities, we follow the direction: technique→tactics→strategy→purpose. For planning and evaluation activities, we follow the inverse direction, i.e., purpose→strategy→tactics→technique.

One’s life purpose might be well-being, happiness, helping others etc. Her strategy, in order to achieve that, could be to take advantage of her athletic abilities and become a great athlete in order to e.g. inspire others or, acquire a high income. Therefore, she could turn to tennis or, say, gymnastics to succeed in her strategy, together with founding a non-profit organization at a later stage. For many people becoming the player with the most wins (“No. 1”) is the ultimate strategy to achieve such a purpose – for some this is even their highest life-purpose. Others could see themselves as a symbol of some sort, trying to capitalize their career as a certain type of media-image, thus investing part of their energy in other self-promoting activities as well. Or, they would attempt to achieve a very certain type of victory in order to use it as means for another goal: win an Olympic medal or some sort of world championship title and then turn to a different type of business. When teaching a sport, we should ensure we develop such a holistic mentality to both ourselves and to our athletes, not just a blind dedication to a supposedly single and absolute goal, such as winning a specific prestigious tournament. The development of autonomous individuals, in the Kantian sense of the word, should be the goal: free from external influences (*heteronomy*), independent, rational agents who use sports as means for their personal development and stop regarding sports as ends in themselves. The sports field is thus transformed into an interactive arena where individuals express themselves, demonstrate empathy, and act in accordance with laws – from simple regulations to universal laws of ethics and reason. Theatrical techniques, among other tools, offer us such teaching capabilities.

[2] Increasing the number of choices increases the Reaction Time (logarithmically).

Theatrical Play & Pedagogy approach (*cf.* Sionti & Papadopoulos, 2011) consists of a versatile set of tools[3] for motor-cognitive-emotional development. If training conditions should resemble actual performance, the most efficient way to achieve that is by setting up a realistic scenario where players' creativity and initiative come into play (Papageorgiou & Papadopoulos 2018).

In general, then, one could summarize the former as: don't just instruct your players to play as if they were hitting the match point, or as if they were kicking the winning goal in soccer;

- use methods such as Neuro-Linguistic Programming and Theatrical Play to mimic competition, to *vividly* bring it to life,
- generalize notions such as "defence", "attack", "adapt" to other real-life situations via theatrical techniques,
- qualify quality over quantity (q cubed approach, q^3).

All that said, we are going to combine two notions that are broadly used in areas as different as kinesiology and psychology, to deepen our understanding about the proposed method.

2. Degrees Of Freedom (DOF) and Contextual Interference

While Bits of Information refer to processing environmental (external) stimuli, DOF are the equivalent for internal ones. DOF are defined as the number of independent elements in a control system together with the number of ways each component can act (Magill, 2007, p. 85). If they increase, both make the individual respond slower (Hick's law). Hence, we will use them as equivalent.

The solutions to the overwhelming complexity of movement in order to efficiently move in a world of information that sculpts the brain of infants making perception ("planning" of movement – tactics), action ("execution" of movement – technique), and cognition (setting broader goals – strategy / purposes) tightly coupled, all make up Bernstein's "Physiology of Activity" (Feldman, 1998, p. 289; Thelen, 1998, p. 285). A strategy employed in such problems consists of "freezing" body segments to reduce DOF (Schmidt & Wrisberg, 2008, p. 120). This manipulation helps individuals learn a more complex movement via a simpler movement analogue. Such forms of simplification are important in the articulation of our model as well.

There are many ways to decrease DOF when referring to e.g. tennis: decreasing the backswing or the follow-through requires fewer DOF. It is easy to show that in situations where other restrictions take effect (e.g. a game without serve or volleys, a game in the half-court), fewer DOF are required too.

Increasing DOF introduces uncomfortable practice situations and may also be viewed as adding *perturbations*. Perturbations increase the Contextual Interference effect (CI), i.e. training with increased "noise" resulting in depressed performance, *but* improved learning (*cf.* Schmidt & Wrisberg, p. 258). The concept of introducing gradually more perturbations to improve learning is an inherent component of the Differential Learning model of Schöllhorn et al. (Schöllhorn, Willem, Mayer-Kress, Newell, & Michelbrink, 2009). In their work, they forward the introduction of stochastic perturbations that increase in number (i.e. more noise), through interventions (e.g. variable practice), in order to produce more and better motor learning, until the optimal level of perturbations is attained in "Differential Learning".

Therefore, a *continuum* or, indeed, a *spiral* – a *performance spiral* (Papageorgiou, 2016)– from low DOF to high DOF may be described. Figure 1 illustrates such a periodization by combining the pseudo-dimensions "DOF" and "CI" applicable to both technique and tactics training. A similar work has been presented for tennis by Reid et al. (Reid, Crespo, Lay, & Berry, 2007). In their work, they used *practice variability* instead of DOF. However, variability is an external factor, whereas DOF is an internal factor and therefore, a more systemically sound one: it is conceivable that a player, despite greater practice variability, "freezes", using the same DOF.

Regular game-play is considered a condition where both DOF and CI have intermediate values. Training takes these dimensions to both positive and negative extremes; the spiral represents the increasing difficulty, as well as the periodization: there is no progression towards an "optimum" way of training – all stages should be repeated again and again, only with increased difficulty, an approach consistent with the Deliberate Practice model (Papageorgiou, 2014).

Figure 1 is (meant to be) a quite self-explanatory diagram. It shows an application to the sport of tennis, but may easily be generalized to other activities as well. In more words:

1. We start training a certain sport (e.g. tennis) introducing game-play from the early beginning (medium CI & medium DOF).
2. The next step would be to train statically as if training a closed motor skill (minimum CI & DOF). Keep your athletes performing for a short while the techniques in a blocked fashion; blocked training is suboptimal if no random practice is introduced briefly after.
3. That would be the next step: after some minutes of blocked practice, static, yet random practice begins (CI increases, DOF remain stable/reduced). We feed our athletes smoothly, but we make them perform more than one hit/action.

[3] Expressional and symbolic representation, stochastic investigation, improvisation etc.

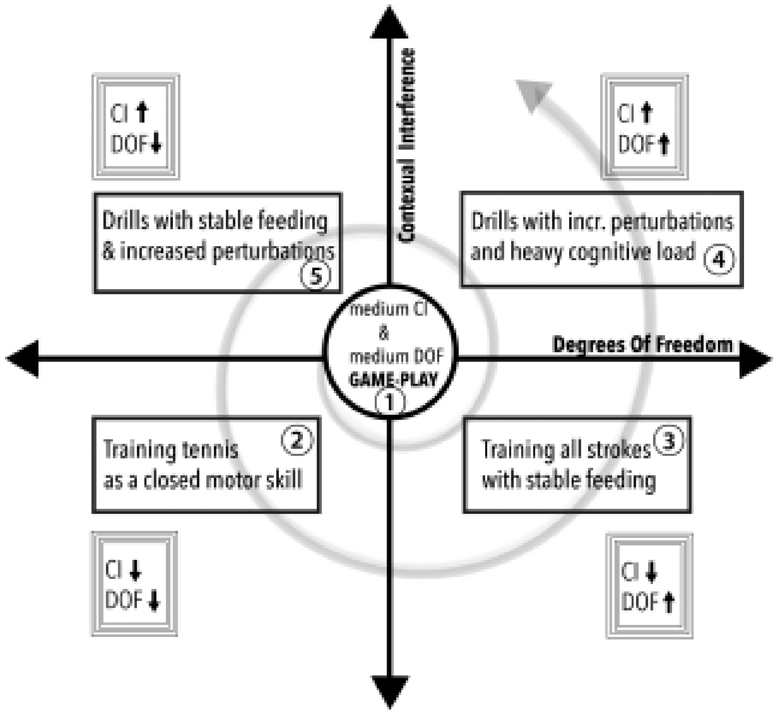

Fig. 1. The (mechanistic) tactics-technique training spiral applied in tennis.

4. The next step requires heavy cognitive load and perturbations (maximum CI & DOF) – it is here that motowords (see below) and other physical and mental techniques take CI and DOF to extreme levels.

5. Lastly, we proceed to train our athlete trying, for example, to destabilize her, while we keep cognitive load decreased – safety precaution here: the athlete must concentrate to keep balance and avoid injury.

Interestingly, as we return to 1, a better athlete is able to train slower, or go slow for longer than a novice one; slow training has been the hallmark of major martial arts schools. Not only can quick get quicker; slow can get slower –both being equally demanding tasks.

This model is a mechanistic one; how could we link it to higher intellectual and emotional capacities? This is the real question. Let's try to answer it!

3. The enriched tactics-technique training spiral – The Distal Method modelized

Formal school and athletic education, both occupy the two extremes in a *continuum*. Formal school *curriculum* is largely context-insensitive/independent, unsituated, *ersatz*, non-indexical, practically unusable and, in that sense, *useless* (Brown, Collins, & Duguid, 1989). On the other side of the *continuum*, sports education has the complementary strengths and weaknesses: it exposes learners to purely practical situations (like drills) combined with a poor cognitive-informational background – other than mere tautologies: "hit the ball harder"; "put the ball in"; "serve better"; "concentrate"; "try to remember"; etc. I argue that a more cognitive approach is needed in an athletic environment: by utilizing the vast cognitive resources of the individual, a better program may be developed that could (e.g.) lead to better learning of motor-skills and sequences[4]. Moreover, "Practice manipulations that require more cognitive effort were predicted to be more effective for motor learning compared to practice manipulations that require less cognitive effort" (Sherwood & Lee, 2003, p. 379). "(…) language opens the way to a wider range of play (…). Even nonsense-words may help in this way, by providing symbolic aids to memory (…)" (Lewis, 1964, p. 127).

Let us remember some key points here linking motor to cognitive skills:

- Schmidt & Wrisberg (2008, pp. 7–8) argue in favour of a motor–cognitive skill *continuum* ("dimension").
- Cognitive, perceptual and motor skills are acquired in essentially the same way (similarities include Transfer Specificity, Learning Rates, and Learning Stages – Edwards, 2010, p. 35). Edwards, instead of Schmidt & Wrisberg's *continuum*, sees a Venn diagram describing better the interrelations of cognition, perception and movement (Edwards, 2010, p.36).
- The same neurophysiological principles support both perceptual-motor and intellectual skills acquisition (Rosenbaum, Augustyn, Cohen, & Jax, 2006, p. 506).

[4]Simply put, skills refer to the technique or to the quality of movement, and sequences to the succession of movements. For example, in yoga, skills are related to the correct body stance, while the succession of different *asanas* is the sequence. In theatre, articulation of each separate word and expressiveness are parts of the actor's skills; remembering the words of the play is, again, related to sequence learning.

• Encoding, consolidation, and retrieval are processes involved, in this order, in memories about facts or motor skills (Kantak & Winstein, 2012, p. 222). For example, exceptional world-class level memorizers used a spatial learning strategy (Maguire, Valentine, Wilding, & Kapur, 2002, p. 90).

• Working memory uses sensorimotor coding, as a wide range of phenomena reveal (e.g. overall pattern of data for sign language and speech is highly similar; findings from memory-impaired patients and brain imaging; "body schema", i.e., implicit connection between perception and action – M. Wilson, 2001, pp. 50–54).

• "For the Cerebellum, Movement and Thought Are Identical Control 'Objects'" (Vandervert, 2009, p. 301): this section title in his article is quite enlightening about the interconnection of the physical and the cognitive at the functional level.

• The way infants move their limbs and torso (in a world of information and physical forces) determines the connections made in their brains and the biomechanical challenges they face; it also determines the solutions infants find that ultimately sculpt their brains (Thelen, 1998, p. 268).

• Development of language was possible only after the evolution of a powerful central motor capacity, enabling hominids to voluntarily control their movements – unlike any other species ("motor modelling skill", or "mimesis" – Donald, Corballis, & Lea, 1999, p. 152).

• Gestures are universal and facilitate thinking (Iverson & Goldin-Meadow, 1998, p. 228; Schwartz & Heiser, 2006, pp. 290–292).

• Deliberate Practice, as well as the workload needed for attaining expertise, are similar in both motor and cognitive expertise (K. A. Ericsson & Lehmann, 1996; Rossum, 2009, p. 770).

• In "talent" development, the relative contribution of distinct parameters (as far as work is concerned) is common in the athletic and cognitive domains alike (Rossum, 2009, p.764).

• Reasons for dropping out are highly similar in arts, athletics, mathematics, music, and science (Rossum, 2009, p.282-783 citing Csikszentmihalyi et al., 1993).

• There are also cases in which the physical exerts its effects on the cognitive domain through feelings, occurring from, e.g., "runner's high", or directly in cognition, through cognitive offloading to motor centres. Likewise, there are cases where cognitive overrides the physical (e.g., placebo & nocebo effect – see for example Magill, 2007, p.345; Wilmore & Costill, 2004, pp.474-475; Weinberg & Gould, 1995, p.367). Emotions affect decisions in both mental and motor domains (Carta et al., 2012, p.190; Poletti et al., 2011; Kano et al., 2011; Goleman 1995 p.91; Latash, 1998, p.82-83).

To better see the relation between cognition and motor learning/performance, let us just consider a simple, yet revealing, example: deaf people's speech – especially when they have practised it via speech therapy. All the muscles in their throat work, as well as all corresponding neural substrates – even though one should expect the weakening of specific speech- / hearing-related centres due to lack of stimuli. However, lacking the phonetic mental model, they cannot talk; even after years of extensive training, their speech still resembles primitive sounds, rather than articulated voice. Now, what are the tools available to develop these super-important cognitive models? The most famous one is *athletic imagery*: "creating or recreating an experience in the mind" (Weinberg & Gould, 1995, p. 280). Imagery alone, or any other technique, is not *panacea*. Improving self-perception, making limiting beliefs extinct, setting appropriate plans, and effectively regulating emotions, all are to be carefully combined. Emotions, for example, seem to directly affect motor skills (Carta et al., 2013; Kano, Ito, & Fukudo, 2011; Latash, 1998).

These lead us to the cognitively-emotionally enriched model:

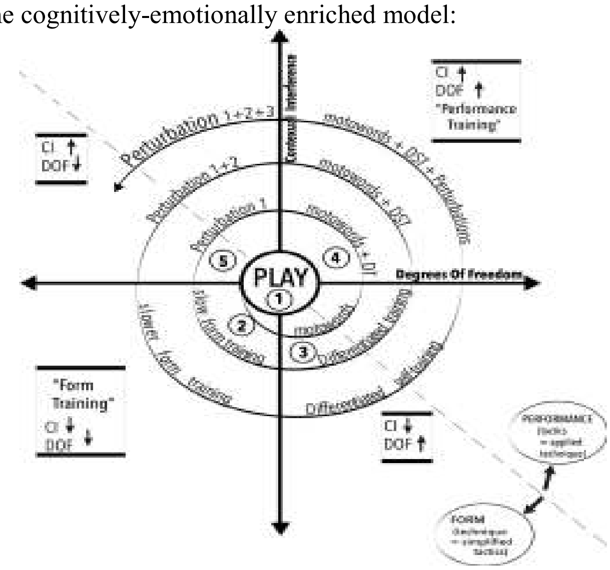

Fig. 2. The complete model for technical-tactical expertise in sports (DST: Differentiated Self Training).

As was the case in the previous form of the model (presented in fig. 1), *playing* is the basis, not drills (quadrant 1). Moreover, as was the case in Performance Spiral (Papageorgiou, 2016) we move around the axes in a spiral fashion. In quadrant (2), both CI and DOF have the minimum value. *Form training* takes place in slow motion, which gets slower and slower as we move around the spiral. In the next quadrant (3), CI is low and DOF increases. To achieve this, we gradually introduce a number of techniques: motowords, DT and DST. Next, in (4), we increase both CI and DOF. It is the most performance-oriented quadrant. We may use the techniques described in that quadrant (fig. 1). In both (4) and (5) there is an increasing amount of perturbations. These perturbations could include anything that "annoys" the player: visual blocks, destabilization, weight loading, noise, yelling, stimulus overload, etc. Note that performance is correlated with tactics: tactics is understood as applied technique, while form (that is, technique plus style) is understood as simplified tactics.

The periodization proposed here is suitable for both micro-periodization, within-practice, or spread among several practice sessions. Depending on the available time, one could include one, two, three or all four quadrants in their practice session. According to the Distal Method approach, including more than one quadrants in each session is the optimal way to achieve motor expertise – on the long run of course.

Next, we shall attempt to review, as briefly as possible, the notions and the ideas that were referred to during the presentation of the model.

4. Constituents of the model

Motowords	Even the most complicated sequences are made of just a handful of basic movement-segments. Learners may *become* able to represent – and automatically learn – a much more complicated sequence, as a series of words, *motowords* – one motoword for each chunk / one *motosyllable* for each chunk-segment[5]. Learners remember the procedural part of the motor skill by virtue of mental-verbal mediation (Schmidt & Wrisberg, 2008, p. 252). Benefits: reduction of feedback (Edwards, 2010, pp. 468–469), increase of Contextual Interference (Maslovat, Chus, Lee, & Franks, 2004), maximization of activity time (Côté, Baker, & Abernethy, 2007), and increase in motivation (fun element).
Differentiated Training (DT)	In Differentiated (drill) Training (DT), the trainer predefines possible outcomes of the drill based on the athlete's performance. For example, if the drill consists of 5 tennis shots, depending on the performance of the 4th shot (e.g. if it met some quality standards or not), the 5th shot may differ: we may decide to feed her an easy ball (to attack) if the 4th ball was hit well, or else, feed her a difficult ball (switch to defence).
Differentiated Self - Training (DST)	Let the athlete take the initiative and choose the outcome: she could decide how to, e.g., hit the 4th ball (out of five), and, based on her choice, the trainer must react in a pre-planned way, feeding the 5th ball accordingly.
Preparatory Training	Consists of basic exercises, such as hopping, galloping, throwing, catching (basic motor skills), or simplified technical exercises in order to achieve good technical form.
Form Training	Form refers to the technique, the final "appearance" of a complete movement; a *domain-representative* skill with a good style that you would expect a professional to be able to demonstrate. Form = technique + personal style.
Performance Training	Trying to use proper form in competitive / competitive-like conditions

There are some accompanying concepts that are important for understanding motowords:

Cognitive Off-Loading	*Cognitive off-loading* is a process bypassing memorization and complex computations (Margaret Wilson, 2002). This is accomplished by utilizing either the environment (I), or *us* (II), to off-load data. An example of (II) is counting with our fingers. In case (I), we exploit an extended notion of a body-based, off-line cognition in which many sensorimotor functions appear to run "off-line" to assist in a variety of abstract mental tasks "as a means of representing information or drawing inferences" (Margaret Wilson, 2002) – such as in the Buddhist monk problem (envision how a monk climbing on a mountain one day, will be on the exact same point when descending the next day spending exactly the same amount of time). Motowords use (II).
Chunking	Chunks are perceptual or memory structures that bond more elementary units into larger organizations (Feltovich, Pretula, & Ericsson, 2006). These researchers also argue that chunks may comprise the vast vocabulary experts develop over time, but due to their spontaneous nature they seem necessary in learning and retaining any kind of sequence. Chunks are also used in motowords
Sequence Learning	*Sequence learning* is the process by which an individual memorizes a series of movements. Sequence learning refers only to the order of individual movements and not to the quality of movement *per se*, which is related to skill learning. However, it would appear that sequence learning produces skill learning as well, by introducing more stochastic perturbations in the distinct skills that together, in succession, form the sequence (Schöllhorn et al., 2009). A common problem for many practitioners is how to teach these *sequences*, or equally, *movement-chunks*. Musicians and type-writers seem to be able to reproduce an enormous amount of movement combinations, not by remembering the movements themselves, but by connecting them with notes or letters, *thus using sounds as prompts*. They remember *chunk segment labels* (cognitive off-loading) rather than motor chunks themselves. Stated another way, they use a strategy of self-priming for the motor task (sequence) at hand (Grossi et al. 2007).

[5] Example: a tennis drill consisting of 3 forehand ("FO") and one backhand ("BA") could be represented by the motoword "FOFOFOBA".

When you start practising form (quadrant 2), notwithstanding any physical and mental attributes developed in (1), remember that you are again a novice. Existing capacities themselves are considered to be a prerequisite. Training the form is another step and should be done from scratch. Form training can only be done in slow motion, and in low CI environments. This is the rationale for the existence of the low CI / DOF parts.

Perfect form achieved! Ready for competition then? No. Having a perfect form means, again, next to nothing for competition. You must practice separately for utilizing your perfect form *in* the competition, from scratch, using (again) a vastly different practising program with increased CI and DOF. Preparatory exercises, form exercises, and performance exercises are different; success in any one of these stages does not guarantee success in the other ones – it merely guarantees the basic ability to progress to the next level.

But why repeat the same steps – even using a spiral? This is because there is an inverse relationship between performance (automatization) and form. The more one performs (e.g. competes), the more he/she worsens their form. Therefore, one will always have to go through preparatory exercises, form exercises, performance exercises, and, of course, actual performance, again and again (Papageorgiou, 2014). There is no point where the need for basics becomes obsolete.

5. Towards a holistic model for learning

Eventually, better learning is the outcome. Learning is "a relatively permanent change in knowledge, behaviour or understanding that results from experience[6]" (Stratton & Hayes, 1993, p. 105). That includes not only maths or dance, but also changing behaviours, controlling emotions, filtering experiences. *Therapeutic coaching* is a holistic approach to life, having as a central dogma that learning is a global, unified, and unifying phenomenon; learning how to solve an equation, how to negotiate better, how to be happier, how to win tennis matches, these are all skills to be acquired through *therapy*, not just instruction. I maintain that this is not a better way; it is the only way. "Therapy" here is used in its classical epistemological context, as was used by philosophers such as Plato (*cf. Harmides*). It means (in Greek) *to serve*. The English-analogue is the word "curator". For example, to "cure" (*therapevein*) a science means to be its humble servant. We should attend to all needs of the learners – instructing them is not *the* way to do that.

When creating drills, in order to incorporate such "abstract" ideas, two more concepts are to be taken into consideration.

- Drill Synthesis

Synthesis (<σύνθεση[7] Gr.) refers to the addition of elements of a set: I may synthesize a certain foodstuff from sugar, flour, water and cocoa – a cake. Similarly, one may synthesize an exercise, a drill: for example, we may choose to hit two crosscourt forehand drives and two down-the-line backhand drives in tennis.

- Drill structure

Structure (<δομή[8] Gr.) refers to the addition of *properties* (sets themselves). I can structure a food that has the properties of e.g. sweetness and fluffiness – thus I must choose the ingredients accordingly (e.g. sugar, aspartame, honey etc. for sweetness and flour for volume). Again, I have a cake! In sports, it is the selection of movements according to an abstract criterion (defence, attack, patience etc.).

A practical example of the above. When studying the piano, there are "meaningless" technical exercises, such as chromatic scales. This is a synthesis of discrete finger-movements. Such exercises should improve the level of manual dexterity, but never can they produce *musicians*. But then, ah, there are the *études*. Take Chopin or Rachmaninoff: they have composed beautiful stand-alone works, which aim at a purposeful technical improvement – not *just* a certain technical aspect. They require certain qualities (properties, interpretational aspects) to be expressed, too. Chopin's étude No. 10 in B minor, Op. 25, is not meant to "simply" improve octave-playing capacity. It is structured in such a way that a most dramatic tone is achieved; the different notes have been selected for the end-product to exhibit the property *dramatic*. The nostalgic middle part (without octaves) only enhances this effect.

Now, how can we effectively introduce (senti)mental elements to our drills? Techniques from Neurolinguistic Programming (NLP) or Theatrical Play & Pedagogy (TPP) may be incorporated either in form- or in performance-training. NLP techniques may be used as an extended imagery-based program to develop *skills*. Theatrical play and pedagogy may be used not so much to develop skills, but rather our personal *stance*: to grow understanding by immersing ourselves in both athletic, *and* ethically or socially tensed situations. Suitable techniques for form training are, for example:

- Frozen images: athletes represent emotions, ideas or snapshots of situations through the creation of a static scene with their bodies used as statues, so to speak (TPP).
- Perspective: different situations call for different perspectives and viewpoints so that athletes may decode their own feelings (TPP).

[6] "[R]esults from experience" as opposed to, "[i]nnate behaviours, maturation and fatigue" (Stratton & Hayes, 1993, p. 105).
[7] This epistemological interpretation of synthesis and structure was proposed by Lekkas (2003).
[8] Δομή (structure) vs. δόμημα (structure) vs. δομική (structuring) vs. δόμηση (structuring).

• Meta-model: we investigate whether our athletes have deeply understood key concepts by trying to make their implicit beliefs explicit through targeted questions (NLP).

Suitable techniques for performance training are, for example:

• Theatrical role-playing: athletes impersonate a role, such as the exhausted athlete, or the teammate in trouble who needs help, or the wronged athlete who has to face the referee, or the winning athlete, and learn, in practice, how to deal with such situations (TPP).

• Improvisations: no matter how well an athlete is prepared, life is full of surprises, and an open mind, as well as a flexible mentality, should be trained if one is to respond well to unforeseen technical or tactical events.

• Sub-modalities: the athlete trains trying to use each time a different source of feedback: from hands, legs, ears etc. or to focus on different type of feedback: touch (haptic feedback), feelings (emotional awareness), heat, smell, acceleration etc. (NLP).

Is there a more general context incorporating all these tools and methods? Indeed there is: the Distal Method.

6. Distal and Proximal Methods

The general context of this approach is based on the distinction between performance and learning. This distinction, despite being so fundamental, with so many implications for training has not yet created a dramatic shift in training methods – as it should have done. Many practitioners are tempted to espouse performance-oriented methods. Such methods (*proximal* methods) hinder performance in the long run; they impede motor (or cognitive) expertise. Proximal methods are based on blocked and mass practice, direct and external motives, automatization and fixed mindsets. On the other hand, methodologies that benefit from random and distributed practice, the growth of internal motives, versatile mindsets, as well as from deliberate practice over a long period of time, may successfully lead to world-class expertise. Such methods are called *Distal* Methods, and I have already proposed one such method (Papageorgiou, 2017b). Proximal methods are based on the *talent hypothesis* ("there *is* talent…"), whereas distal methods are based on sound scientific insights. Distal methods lead to *distal adaptations*: plastic changes *beyond* the current capacities of the athlete. On the other hand, proximal adaptations improve performance, but always *within* the athlete's current abilities. The holistic approach proposed here is within the context of such a distal method. It is called the Distal Method.

The Distal Method is presented in detail *elsewhere* (Papageorgiou, 2017b). The Distal Method was the result of an extended bibliographic research combined with research and empirical evidence (Papageorgiou, 2015, 2016, 2017a; Papageorgiou, Lekkas, & Koulianou, 2015). The Distal Method is condensed in a series of guidelines. Here, a selection of these guidelines will be presented; ones that are less technical and more general in nature. I will not put too much effort into explaining them. This work is not about the guidelines of distal method themselves; its purpose is to give the general idea of the concepts related to motor expertise, education and developing individuals to their full potential – of the *Distal Method*.

6.1 Practicing, feedback and skills.

1. Skilled performers should have enough time to deal with the cognitive load of their task in practice before they rely on the automated processes when performing.
2. Performers should try and integrate a variety of senses as a source of feedback.
3. Learners should prefer to practice multiple tasks in highly randomized order, even when just one task is of primary concern.
4. Demonstrations should include both types of information, both complex and simple in order to maximize learning.
5. An additional factor affecting the effectiveness of transfer[9] are cognitive skills and more specifically, consciousness (seen as self-awareness) in practice; performers need not only include skill training, but, try to be as conscious as possible when practising (mainly via self-monitoring).
6. Reduced feedback from the environment is necessary for performers to gain independency later on.
7. Skills are embedded in the environment or, equally, in the senses. Performers should be exposed to a wide variety of stimuli.
8. Always vary practice schedules.
9. Don't segment your training too much: practice should include all parts and whole movements as soon as possible (within the session).
10. Both within and between sessions, distribute practice in identifiable parts – avoid continuous practice for too long, always take breaks. This produces better learning, especially if sleep is intermediated (applicable to between-session distribution). Sleep must not be reduced in favour of e.g. more training, as the final result will not be optimal (or even be negative).
11. Cross-training benefits performance through various mechanisms, including transfer, and should be regularly practised: include many similar activities.

[9] Transfer of skills refers to the improvement of similar skills when only one in practiced.

12. Peer-learning activities should be central in learning environments. Directions should be kept to a minimum, as well as the teacher's involvement. Don't let teachers "teach" too much!

13. Testing is an important part of the learning experience.

14. Photographs, videos etc. that show the trajectories of the movement are highly insufficient for learning the movement itself.

15. Early preparation of the movement should be stressed continuously.

16. It is of vital importance to dedicate a considerable amount of time and effort to develop the mental and cognitive capacities of the athlete in a *holistic* way.

17. You will always have to go through the basics, again and again.

18. Neurolinguistic Programming, Mental Imagery, Theatre Pedagogy, Priority Therapy, Therapeutic Coaching etc. are of vital importance for the development of sound mental models, mental meta-models and for still other cognitive and mental aspects of high performance (motives, priorities etc.).

19. It is more useful practice-wise and performance-wise to consider your own body as part of the external environment and not as something under your full control.

20. In practice, an individual should train high-quality movement automaticity deliberately – not just let automaticity prevail.

21. Motor memories persist, and short-term interventions are insufficient to change them.

22. Sleep is not only necessary for learning- and performance-consolidation, but it boosts them as well in various ways. Substantial adaptations happen only during rest, never during training, and performing is detrimental to most skills.

23. Learn how to recognize and manipulate consciousness states (as they are identified by different brain-waves).

6.2 Deliberate Practice guidelines

Deliberate Practice was the outcome of Ericsson et al. research, as was published in their 1993 classic paper. Its basic tenet is that no matter what you study, be it math or tennis, you need, apart from various other activities (e.g. play), a huge amount of deliberate and well-structured practice – thousands of hours spanning for many years for most activities.

24. Find strategies for learners to participate more in structured practice activities. Deliberate practice may be successfully combined with self-learning and peer teaching.

25. Deliberate practice is the golden standard of practice for all skill levels – even if performers should expect their capacity to engage in deliberate practice itself to evolve with time and effort.

26. Deliberate practice, in absolute terms, is demanding both in time and in physical/mental resources.

27. Experts engage in a different type of deliberate practice that is inaccessible to novices who differ ontologically; novices should consciously expect their understanding of practice to grow.

28. Deliberate practice is domain-specific and should be viewed as a skill.

29. Deliberate practice is *not* an optional part in the development of *contributory* expertise.

30. A long engagement with an activity is needed; "how much" is domain-specific and practitioners (trainers etc.) should find themselves the adequate amount of deliberate practice for their specific domain.

31. Deliberate practice is a way of practice, but it does not include the *content* of practice. Therefore, it may fail if the content of practice is not appropriate.

32. Automatization is of the utmost importance in performing and detrimental in practising. Deliberate practice leads to better-quality performance automatization and should be utilized to improve automatization.

33. Performing (automaticity) leads to worsening, not improving, which must be counterbalanced by deliberate practice.

34. Improvement in older individuals is a mental process by all aspects; even thus deliberate practice is important, but serves different purposes than in younger individuals. In any case, deliberate practice must be central in all ages.

35. Younger individuals (and parents?) should be informed that, when sacrificing a part of the immediate enjoyment, they are going to play more both in the long and in the short term.

36. Individuals should seek to engage in deliberate practice activities only within an appropriate School (not an ersatz school) *if* elite level is to be achieved.

6.3 Talent & Motivation

The concept of talent is a bit "anti-deliberate-practice". You're a talent – therefore you don't need as much deliberate practice. Otherwise, what's the meaning of being a talent. Right? Right! But, I don't believe in talents[10], I believe in deliberate practice. I don't know anyone who got away with less practice – even the most successful, "talented" and best-paid performers; or should I say, especially such individuals invested the most time in serious practice. Generally speaking, if any "talent" exists, that is the one of intrinsic motivation.

[10] What's open for me, is the case of, let's say, "anti-talents", that is, of individuals who have specific biological or mental handicaps which really stand in their way of excellence.

Talent is a meta-value judgment and a potential-potential , the existence of which, however, cannot yet be neither precluded nor confirmed.

37. "Talent" has (yet) no predictive or explanatory powers for expertise attainment. If not just describing talent as a personal characteristic, like eye colour, or height, but attempt to enrich it with other properties (usually predictive – see "talent hunters") researchers and educators alike are disoriented.

38. Therefore, it is proposed that the terms related to talent should be abandoned in educational environments.

39. Terms like "talented", "gifted" etc., pose another danger: because they are considered "magical" from the general public's point of view, children who do have very (or even extremely) developed abilities in relation to their peers, because they are considered "talents", they are often left without help believing that some kind of "natural talent" will lead their progress, and not high-quality work. Work (practice) is always the most important determinant in expertise attainment.

40. The study of talent is the study of expertise.

41. Creativity must be considered and enhanced in the development of experts via a multimodal, extracurricular exposure.

42. How to study (deliberate practice) in combination with what to study (Distal Method) are proposed to ensure success to all adequately motivated individuals and prevent the cases of failure that are observed and cited in the available literature.

43. Motivation is a globally recognized performance factor.

44. Motivation (the way it is presently defined by social convention) is both inherited and nurtured, but its growth is the most important aspect as may be greatly manipulated by teachers or individuals themselves.

45. Motivation is distinct from demotivation and a learning methodology should have tools for both fostering motivation *and* coping with demotivation.

46. Motivation should enhance both participation and understanding.

47. Activities should be intrinsically motivating and external motivation (rewards) should be kept to a minimum, assuming one has appropriately demarcated "internal" vs. "external".

48. A critical period for learners exists before they attain a good level after which they will become more (internally) motivated to continue. In that period the drop-out rate decreases if practitioners locate and respect individuals' learning styles.

6.4 Schools

Some final guidelines taken *not* from scientific findings (as was the case with the previous propositions), but from my experience with Schools. Schools are represented by great traditions and enlightened teachers; their aim is enlightenment; their means for achieving that vary: from martial arts to meditation.

49. Relaxation is a characteristic of performance that is central in School teachings and helps performers not only to avoid strain, but to also reach high levels of virtuosity.

50. Weighting factors should be attributed to exercises.

51. The development of basic techniques is a prerequisite for every successful discipline.

52. Daydreaming (and magical thinking) is highly unwanted, contrary to what people outside of Schools think about it. Instead, a good, i.e. unbiased contact with reality is promoted.

53. On the other hand, it cannot be stressed enough how important cognitive abilities are: mental models, motivation.

54. Slow practice is an inherent part of high-level practice.

55. Even the slightest detail is to be taught and become explicit if high-class performance is the desired outcome.

56. Mastering the form of a skill is a prerequisite to high performance – not the other way around.

Conclusions

Distal Method was meant to bridge the gap between Ericsson's deliberate practice model (context) and practice (content). Specifically, it addresses the question: what should be the content of (deliberate) practice? Distal Method has since evolved to a complete paradigm that aspires to provide both the context *and* the tools for a holistic and balanced development when expertise is the goal. Being so multidisciplinary, it may well be beneficial for the needs of learners whose goal is not expertise *per se*, but learning in general. Such populations may include, from primary school pupils to special-needs children – even to disease (Papageorgiou 2018). Future studies should examine the application of the Distal Method to the needs of specific target groups, either in the form of theoretical models, or in the form of case studies.

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