

A draft model to bridge a glaring NDM gap: motivation

Brian MOON^a, Shannon BILDSTEIN^a

^a*Perigean Technologies*

ABSTRACT

The NDM community has provided many discoveries about the nature of macrocognition and expertise and its development. More recently, significant contributions have outlined practical approaches for accelerating the achievement of expertise in professionals. Yet almost universally, the NDM community has sidestepped, explained away, or resorted to Aristotelian essentialism, to explain a *sine qua non* for the achievement of expertise: motivation. Why do some people achieve expertise – sometimes in relatively obscure domains – when similar conditions, attributes and opportunities are afforded others? This paper offers a draft model for explaining the development of the motivation to become an expert. The model draws on a ground-breaking, empirically-based model from social psychology that outlines a developmental process for becoming violent, and on an exploratory empirical study in several domains. The model suggests an initial set of practical guidance to aid in the selection for and encouragement of expertise development in people.

KEYWORDS

Motivation; macrocognition; expertise; coaching; violentization.

INTRODUCTION

The NDM community has provided many discoveries about the nature of macrocognition and expertise and its development. More recently, significant contributions have outlined practical approaches for accelerating the achievement of expertise in professionals (Hoffman et al., 2013). Among the potential levers for accelerating achievement, the NDM community have suggested that motivation may be a useful focus. “It would certainly be useful if there were measures of motivation that might predict attrition, potentially resulting from the inability to retain and adapt existing knowledge” (ibid, p. 140). Indeed, motivation has been cited as a *sine qua non* for the development of expertise: “high levels of motivation—that is, intrinsic motivation to work on hard problems—is a defining feature of what it means for an individual to achieve the highest levels of proficiency” (ibid, p. 82). Unfortunately, the NDM community does “...not have an actionable empirical base about ... what motivates people to engage in the deliberate practice needed to maintain and develop skill” (ibid, p. 65).

Despite this obvious gap – which calls out as an opportunity for research focus – almost universally the NDM community has sidestepped or explained away this prerequisite. While noting that “...few expertise researchers have focused on motivational factors that underpin the development of expert performance” (ibid, p. 141), the mantle of offering compelling directions toward understanding motivation has been handed off to other communities: “Researchers who study self-regulation [are needed to] provide understandings of the motivational and emotional requirements of dedicated intense effort, strategies for coping with failure and disappointment, and ‘perceived efficacy to maintain interest in the face of inevitable periodic setbacks’” (ibid, p. 166). Until other communities figure it out, NDM researchers seem content to forge ahead and rest their recommendations on Aristotelian essentialism (Popper, 1957) and/or outright tautologies to account for it: “In simple terms, those who are highly motivated to improve are more likely to become experts, whereas those who are not intrinsically motivated are less likely” (Hoffman et al., 2013; p. 128).

This “you-either-got-it-or-you-don’t” perspective begs the underlying question of motivation. Moreover, it weakens the NDM’s community’s claim to offering viable solutions for accelerating the achievement of expertise. The critical gap in understanding is often passed along to those the community seeks to help: “Training must take into account individual differences in...intrinsic motivation” (ibid, p. 180). Those friendly to the NDM perspective perpetuate the gap into still other communities: “A necessary part of the development of expertise is motivation and self-regulatory processes. The expert’s motivation focuses on mastery which is associated with persistence toward a goal” (Persky, 2017). The problem extends beyond the NDM purview into related communities: “Motivation as an element of creativity is best approached by individuals with intrinsic, task-focused motivation. For the most part, without motivation, creativity will not take place” (Feenstra, 2010).

The fundamental challenge remains: How can the NDM community explain why some people achieve expert-level performance – sometimes in relatively obscure domains – where others do not, even given similar conditions, attributes and opportunities afforded them? A secondary challenge can also be stated: can the NDM community offer an explanation that extends – rather than offends – its fundamental adherence to the principles of naturalism?

This paper offers a draft model of a developmental process explaining how people become motivated toward becoming an expert. The model draws on a ground-breaking model from social psychology that outlines an

empirically-based – i.e., naturalistic – developmental process that explains how people become violent. The model was derived from naturalistic study of violent people and people who, by virtue of shared experiences, might have also become violent but did not. We take from the model guidance on what an *agentic* model of expertise development should include, and we offer an initial test of the model using data gathered from exploring the development of elite performers in sport, entertainment, and even NDM research. We close the paper with caveats for the model and a set of practical guidance that could be used to aid in the selection for and encouragement of expertise development in people.

The goals of the paper are threefold. First, we seek to highlight where the NDM community continues to suffer from the hangovers of twentieth century schools of psychology, with the hope of encouraging the community to keep sight of its own roots in the naturalistic study of expertise (Klein et al., 2003; Moon, 2002). Second, we seek to close the gap in understanding how developmental processes enable the development of expert performers, and to draw connections between observed behaviors of experts and their experiential roots. Lastly, we seek to move the practical considerations of motivation from “measures” to “experiences”. We believe knowing where people are on the pathway toward expertise offers much greater promise for selecting promising candidates and, perhaps more importantly, deselection others.

THE HANGOVER OF “FACTORS” AND “MECHANISMS”

As Moon (2002) has observed, the NDM community has been less than clear about what the “naturalistic” bit actually refers to – sometimes it refers to the situations of study, sometimes the settings, or subjects, or practical applications. In other communities that claim naturalistic affinities, the focus is entirely clear:

[N]aturalistic investigation [is] investigation that is directed to a given empirical world in its natural, ongoing character instead of a simulation of that world, or to an abstraction from it, or to a substitute for the world in the form of a preset image of it... [The naturalistic perspective]...recognizes that the genuine mark of an empirical science is to respect the nature of its empirical world—to fit its problems, its guiding conceptions, its procedures of inquiry, its techniques of study, its concepts, and its theories to that world...It is exemplified among the grand figures of the natural sciences by Charles Darwin (Blumer, 1969; pp. 21-47)

Out of respect for the empirical world, the naturalistic perspective begins with only basic assumptions about humans; namely that:

...the human individual confronts a world that s/he must interpret in order to act instead of an environment to which s/he responds because of his/her organization. S/he has to cope with the situations in which s/he is called on to act, ascertaining the meaning of the actions of others and mapping out his/her own line of action in the light of such interpretation.¹ S/he has to construct and guide his/her action instead of merely releasing it in response to factors playing on or operating through him/her... This view...stands sharply in contrast to the view of human action that dominates current psychological and social science...[which] ascribes human action to *an initiating factor or combination of such factors*. Action is traced back to such matters as *motives*, attitudes, need-dispositions, unconscious complexes, stimuli configurations, status demands... and situational demands (ibid, p. 15; italics added).

Herbert Blumer wrote these words over 50 years ago, yet they remain as true today. That the expertise studies community continues to be plagued by the dominate perspective is evident in how it conceptualizes motivation. Wai (2016), in reviewing Gobet’s *Understanding Expertise*, hints at elements of a developmental and agentic perspective (italics), but ultimately finds in Gobet a fall back to “factors” and “mechanisms” (bold italics):

Regarding performance-based expertise, [Gobet] acknowledges that considerable practice is required over many years and that *a coach or teacher is helpful to keep ones intrinsic motivation at continuously high levels*. The role of luck is acknowledged, ***including an ideal set of factors: genes, family characteristics, where and when one was born, and gender***. ...He stresses that the *strategic choice of domain is critical*, and it’s best you select a domain ***in which you have talent***. ... Finally, Gobet says that such a choice might be fortuitous and part of luck, and that one must be in a suitable environment to ***have all these elements converge*** to provide the crucible for expertise development... Gobet notes that “a successful theory of expertise will be complex, with ***mechanisms interacting at different levels***.”

It is clear that the major proponents of NDM, despite hinting at a preference for a developmental perspective, remain hungover:

Proficiency at the highest levels (senior expert) has been referred to as ‘the 5 percenters’ or ‘super-experts’. Achievement at this level has to do with ***predisposition, personality, curiosity, drive***—all the *experiential* and motivational ***factors*** that separate out the individuals who become experts from those who do not (Hoffman et al., 2013; p. 167).

¹ Close readers will note the striking similarity to variation 1 of the recognition-primed decision making model (Klein et al., 1986).

A GUIDE ON THE ROAD TO RECOVERY

As an antidote to the hangover, it is instructive to explore a domain of human life that has been studied using a strictly naturalistic perspective. The origins of violent behavior have long bedevilled human life. For all of the research into violence, the critical barrier to progress in understanding and preventing or at least mitigating it remains – namely, the lack of an up-close and personal study of the subject matter. Major publications on the matter expose this barrier. The Centers for Disease Control - Kaiser Permanente *Adverse Childhood Experiences Study* used the results of confidential surveys to draw correlations between childhood experiences and current health status and behaviors, including violence (Felitti, 1998). Such correlations remain the dominant paradigm for understanding violence, evidenced by *Shared Risk and Protective Factors Across Multiple Forms of Violence* (Wilkins, et al. 2014). Unfortunately, such factors only offer general likelihoods that any particular individual will commit violence. Even the risk factor that ostensibly should be strongest – being a victim of violence – turns out to be not very useful: “Most people who are victims of violence do not act violently” (ibid, p.5). The picture that emerges from these portrayals of the mystery of violence eruption, is one in which human beings are passive vessels through which risk and protective factors operate. Ironically, the CDC suggests in its *Summary of Actions to Prevent Youth Violence* (CDC, 2019), that young people can play an active (i.e., agentic) role in prevention by “mak(ing) choices that promote safety and opportunities to thrive”. So while people seem to have no agency over the roots of their violence, they are granted such agency in its prevention.

The seminal theory of violentization formulated by Lonnie Athens offers a pathway through the barrier to understanding. Described in a series of groundbreaking studies using naturalistic methods (Athens, 1997; Athens and Ulmer, 2003) and extended from the individual to the societal level (Athens, 2015), Athens’ violentization theory provides an empirically valid explanation of the development of dangerous violent criminals – i.e., perpetrators who deliberately injure a victim(s) either fatally or to a degree that usually warrants a physician’s attention or sexually violates a victim(s) under either the threat of substantial physical injury or the actual infliction of substantial or less severe physical injury. Space here is not available to fully restate the violentization process, but an abbreviated review of the first three stages is necessary for our purpose to show how Athens’ detailed, nuanced theory stands with respect to the oft-cited “risk factors.” Italics are added to emphasize agentic features.

Violentization theory views violent criminals as undergoing a *special form of socialization that prepares them to fight violent dominance engagements*. This socialization does not occur instantaneously, but rather *over a relatively lengthy yet contingent process that unfolds over five stages. As each new stage of this process is completed, the person becomes more violent*. The first stage, brutalization, is comprised of three *distinct social acts*: (1) violent subjugation, (2) personal horrification, and (3) violent coaching. During violent subjugation, people *suffer* either a major or minor defeat in a violent engagement, or back down or retreat in a violent skirmish...during personal horrification, they *witness* their intimates suffer minor or major defeats in violent dominative engagements, or retreat or back down in violent skirmishes... during violent coaching, a superordinate assigns himself the role of coach and assigns a perceived subordinate to the role of novice. *The coach instructs* the novice that he should never try to avoid, appease, ignore, or run from his opponents during dominative encounters, but instead should always physically attack them with the intent to kill or gravely injure them. Defiance is the second stage in the violentization process. Here, subordinates desperately *want to resolve* the unbearable crisis into which their earlier brutalization has thrown them...(and)... repeatedly ask themselves why they are being brutalized and what, if anything, they can do about it... (until)...*it finally dawns on them* that what their coach told them is true after all: the only real way anyone can put a stop to their brutalization is to become violent themselves. If...the subordinates *vow from this moment on* to kill or gravely harm anyone who attempts to violently subjugate them during a dominative encounter, then they become a “violent person.” *Making this mitigated violent vow... marks the birth* of a violent person...(and)...their graduation from the defiance stage. The third stage... is violent dominative engagement, during which “violent persons” *put the mitigated violent vow that they made during the defiance stage to the proverbial test* of “trial by fire.” *This requires* that a dominative encounter escalate into a violent engagement, rather than merely end in a tiff or skirmish. Graduation from the violent dominance engagement stage *also requires that* people not only fight several dominative engagements, but also score at least one or two major victories against a feared opponent (Athens, 2017; pp. 6-8).

There are obvious differences between becoming violent and becoming an expert-level performer, not the least of which is the moral attributes granted to each. Yet the parallels are also worth noting. For both, explorations of ‘factors’ and ‘mechanisms’ fall apart in light of empirical facts. For every person whose experience includes any of the ‘factors’ and who go on to commit violent acts, there are literally billions of others who may very well have experienced and/or comprise all of them but do not commit violence. The same can be said for the achievement of expertise: many performers share similar circumstances, have the necessary physical and cognitive abilities, and have available to them the same opportunities as others – yet only ‘5 percent’ achieve expertise. Thankfully, the achievement of an ultra-violent person is also quite rare (Athens, 2015). While space does not allow full exploration of the situational model of violent criminal acts that Athens has also developed (1997) from his naturalistic studies, suffice it to say that the structure of the model bears close resemblance to macrocognitive

model of expert performance (Klein et al., 2003). Perhaps the most instructive parallel concerns the underlying methodology that enabled the explication of both. In NDM parlance, it can be said that Athens used a version of the Critical Decision Method (Crandall et al., 2006) – executed across the span of his participants’ lives – to ferret out the stages and stagegates through which people may pass – or get stuck in or revert to – on the road to becoming violent.

The parallels are intriguing enough to suggest that Athens’ model may be instructive for reframing how to think about the development of the motivation to become an expert – i.e., to shift from factors and mechanisms to developmental experiences. With Athens’ violentization model as a guide, we can sketch a draft model of the development of motivation to become an expert.

A DRAFT MODEL

The hallmarks of the Athens’ developmental model are: stages; stage-gates involving agency for passage through (after an initial stage); off-ramps and reversions; social interaction; and contemplation. Our draft model addresses each. Since the model is intended to apply broadly, we refer to activities, which comprise tasks. As with the violentization process, passage through stages may occur across many activities and over the course of days, months or years, and may occur throughout life. Most importantly, passage through stages is not inevitable – it is highly contingent.

Stage 0: Living Life. This prestage comprises the performance of everyday, routine activities and tasks, which may or may not be encouraged or required. For young people, such activities may include attending school, participating in extra-curricular activities, or doing nothing at all of consequence. For working people, these activities may involve learning and executing the tasks of their given job or role. For some activities, physical attributes may provide efficiency or other performance advantages. For others, skills developed in one activity may be transferrable to other tasks at hand. In this stage, life *happens around* people as they go about their days – decisions of agency are limited to what to do next and how to achieve expected goals. The vast majority of human activity and development falls within this stage as people pursue life-sustaining work and play.

Stage 1: Preconize. The first stage of the development of motivation occurs in the context of the prestage. In this stage, an experience *happens to* the person; specifically, an individual’s performance of a task becomes the subject of another’s preconizing, either publicly or in private. The preconizer must be an important intimate who holds a position of superiority vis-à-vis the performer such as a coach, relative, or more experienced peer. Importantly, preconizing need not be accurate regarding the actual performance – public commendation is often given as means toward a variety of ends (which can sound like: “You were great, baby”). Nor does the preconizing need to be commendatory. It might also call into question why the performer is pursuing a particular activity, or why a performer is pursuing an activity when it clearly is not a match to their capabilities or potential (sounds like: “Why are you even here?”). Once the proclamation is made and the performer is inherently engaged in the act of preconizing, the performer begins to contemplate whether their performance is actually worthy of the proclamation or matches the performer’s assessment of his/her own performance. Such contemplation can draw on domain-relevant metrics (i.e., points of comparison, Moon et al., 2004) regarding the performance – to include the observed or reported performances of similarly-situated performers – explicit discussions with the proclaimer and/or others, and/or a belief or suspicion that the preconizer must have privileged access to information about the performance. Several outcomes of the contemplation are possible. In the case of a positive proclamation, the performer may conclude that their performance is indeed worthy of the praise, or that the performance was worthy but not special or in some way anomalous or the result of factors outside of their control (sounds like: “I got lucky”). In the case of a negative proclamation, the performer may consider whether the performance was indeed not adequate, either as a result of their own performance or factors outside of their control (sounds like: “The referees were terrible”), or whether the proclamation was not warranted for one reason or another. The stage may comprise a single performance, but more typically comprises multiple performances and proclamations, during and after which the performer continually contemplates. The attendant feelings² during this stage associate with nervousness and apprehension, which may be exacerbated or mitigated by the nature of the proclamations about the performances.

Stage 2: Tentative Resolution. Reaching a conclusion to the contemplation marks the beginning of the third stage. At this point, the performer determines whether the basis of the proclamation about the performance was warranted, and what, if anything, should be done about it. The performer may conclude that a positive proclamation(s) was/were warranted, that further pursuit of the activity or task is likely to result in continuation of positive preconizing, and seek additional, related pursuits that may offer more likely or even more positive proclamations. The performer may conclude that a negative proclamation was not warranted, that further pursuit of the activity or task may result in future of positive preconizing, and seek related pursuits that might offer positive proclamations. Or the performer may conclude that a negative proclamation was indeed warranted and discontinue the activity altogether or look to minimize their involvement in the tasks. As additional tasks are pursued, the

² We share in Mosier and Fischer’s (2009) concern for the need to take a more holistic look at the lived experience of performers.

performer becomes more attuned to others' preconizing, and the contexts of the pursuit, in particular how the activities or tasks are characterized. Heightened awareness now enables the performer to gauge tasks and the activity by their perceived and actual difficulty and perceived value in the activity. Activities deemed by the others as particularly difficult and valuable begin to take on greater importance for the performer, such that achieving goals and/or proclamations for more important activities and tasks is given greater import. Armed with these new metrics, the performer may surprise his/her self by how easy the performance comes to them, and/or be surprised by others who do not seem to be comprehending or grasping the activity or task. The performer draws on the performance of others, the same and newly-identified metrics of the performance, and in the proclamations about their performance, to continuously gauge performance. Of particular importance are proclamations that take the form of selection to engage in new activities or tasks, though these too are gauged by the context of the selection and the capriciousness that may accompany selection processes (sounds like: "The boss just liked him better"). Performance of a perceived or actually difficult task of perceived value, coupled with a warranted positive proclamation about the performance, may initiate the next stage, though many exigencies or happenstances may also block advancement to the next stage (sounds like: "I coulda been a contender"). For performers who do not experience the trifecta – difficulty, value, proclamation – the pursuit may continue indefinitely, or the performer may give up the activities altogether, or seek other applications of the skills acquired during performances. The attendant feelings during this stage may associate with emergent confidence, which may be exacerbated, mitigated, or reversed by the nature of the proclamations about and/or actual outcomes of the performances.

Stage 3: Commitment. The initiation of this stage is marked by a firm resolution to continue the pursuit of the activity. Beyond the resolution made in stage 2, however, this resolution represents a qualitatively different level and type of commitment. The performer not only resolves to pursue the activity and associated tasks, but also resolves to *decommit* to other activities and tasks and to adopt the accoutrements and symbols associated with the domain of activity. The performer also engages in and marshals resources toward enabling activities and tasks that support pursuit, and disengages in those that do not support. This is not a trivial decision, and thus can draw the admiration and/or ire of others, to include the same intimates who may previously have preconized positively or negatively. The performer's new commitment also opens up to new opportunities to engage in more difficult and more highly-valued activities, and concomitantly, increased scrutiny of their performances. Each opportunity presents a test; if the performer opts out of or presents a less-than-desirable performance, reversion to stage 2 is possible. Gauging performance at this stage focuses almost exclusively on the domain-relevant metrics and comparisons with other performances; the relative value of preconizing becomes greatly diminished. As such, reconciling *actual* performance with the metrics becomes more challenging – and thus, many performers find it difficult to approach, let alone exceed, the expectations set by the highest-level performers that have come before them. But the significant investment the performer has expended throughout this stage and the social cohesion that the pursuit of activities that has built around the performer can sustain continuation of the pursuit indefinitely. Only a major disruption or spectacular – i.e., in terms of outcome and/or publicity – failure in performance can derail continued pursuit. Most high-achieving performers will remain in this stage indefinitely, experiencing major successes and some minor failures in performance. The attendant feelings during this stage associate with increasing confidence, perhaps punctuated by palpable moments or periods of anxiety, which may be exacerbated, mitigated, or reversed by the nature of the proclamations about and/or actual outcomes of the performances.

Stage 4: Submission. Entrance into the final stage is marked by an explicit resolution to submit to deliberate practice (Ericsson et al., 1993). The decision to submit is the weightiest one the performer has made to date – few performers will pass through this stage's gate. The performer in effect turns over his/her development to people and processes identified with expert-level performance, *if they are available* to the performer. If they are not available, the performer will remain in stage 3, seeking access or resigning to the lack of access and settling on contentment with their achievements. If opportunities for legitimate deliberate practice are available, the performer will grant authority to superiors over him/her, accepting all direction, feedback, and preconizing about their performances. Direction will include requirements to perform the most difficult and valued tasks – without the previous stage's option to opt out. Submission also brings a new view of one's self, shifting from that of a high-level performer to now viewing oneself as an apprentice whose mastery of the activities and tasks will be a life-long journey. The attendant feelings during this stage may associate with humility, which may be exacerbated, mitigated, or reversed by the nature of the proclamations about and/or actual outcomes of the performances. Indeed, the emotive shift from stage 3-level confidence to stage 4's humility is so weighty that it forms a key deterrent for passage into this stage (see Athens's model of dramatic self change for an insightful discussion; Athens, 1995). The reward, however, for making the leap is a significant reduction in the attendant feelings of anxiety.

PARALLELS WITH OTHER EMPIRICAL FINDINGS

In offering the draft model, we do not suggest it to be entirely unrecognized by the NDM and sister communities. Proponents have offered glimpses at our proffered stages. For example, Ward et al. (2007) suggested that "the nature of one's motivation has been shown to evolve with increases in expertise level: from being initially motivated by engagement in an activity (i.e., process focused) toward being product or outcome oriented," which

we see as a key shift in stage 2. Hoffman et al. (2013) caution that “trainees need to have a sense of achievement to balance a sense of failure, which might be more impactful [especially when] the work is cognitively difficult and hence trainees might be especially prone to failure in the early phases of instruction” (p. 141), which echoes events in stage 3. Perhaps not surprisingly, many findings from the study of proficient performance reflect the experience of stage 4. For example, Podgórski and Pawlak (2011) report from the study of high-performance athletes that players with a strong belief in their abilities experienced significantly lesser physical and psychological stress than athletes who doubted their skills – as we might expect in stage 3 – and experienced athletes are significantly better than inexperienced ones at perceiving and applying the instructions given by coaches and during visual presentations, as follows from our proposed stage 4. The purpose for explicating the draft model is to begin to craft a comprehensive model of the development of motivation that can be empirically testing using naturalistic methods. We have conducted such an initial test.

INITIAL EMPIRICAL VALIDATION

As a tentative model, it is reasonable to initially validate it by use of empirical experiences to which we have the readiest access. Thus, we have drawn on our own experiences with the process of becoming high-level performers and in observations of others having gone through or are going through it. We conducted three structured interviews. One was with a former USA Field Hockey (USAFH) team member who competed internationally, one with her club coach, and one with a field hockey player with deep experience in the USAFH development pipeline. The interviews included domain-specific sets of questions that requested the participants to expound on their experience relevant to field hockey and their attendant feelings, thoughts, and behaviors, and those of others around them. We also reviewed interviews conducted with Adam Lambert, a former American Idol contestant and current front-man for Queen, and his family for the ABC documentary *The Show Must Go On: The Queen and Adam Lambert Story*. And one of the authors conducted a review of life experiences. Thus, our data reflect three highly varied domains, drawing on data collected for the purpose of testing the model and other, unrelated purposes. Ideally, the data collected for other purposes should validate the model – indeed, such data would be the strongest test case for the model. Table 1 presents extracts from our data that briefly illustrate the stages.

Performer	Stage 0	Stage 1	Stage 2	Stage 3	Stage 4
USAFH player	In elementary school, I played basketball and soccer. I remember always being aggressive – diving out of bounds. Started playing field hockey because I liked the new skirts the high school team go.	I started noticing I could keep up with and was even better than the boys at sports. With field hockey, I heard other parents say I was only getting selected because my parents worked at the school. But I was scoring a lot of goals.	I was put on Junior Varsity as a freshman. I was mad. My parents said I needed to standout to make varsity. I scored a lot of goals and got pulled up a week later. I heard the other team’s parents yell “hit her again” after I got hit in the chin. I started getting attention from colleges, and realized I was pretty good at this.	I started playing club and was selected for USAFH Futures program. During my junior and senior years, I missed out on a lot of social activities to go to tournaments. I was so obsessed with field hockey. When others complained about optional practice, I stayed after and loved it. I felt like field hockey was my journey.	During high school, I asked my parents for private lessons from a USAFH player. I couldn’t play in the air, didn’t hit well, and my lifts needed improvement. I knew I needed these to standout. I’d made the U17 undersquad but didn’t get picked for the tour team and my confidence was struggling. The next year I made captain, but still didn’t feel like I was “good, good”. Eventually, I made the national team.
Club coach of USAFH player			After she was placed on the JV, it was the other girls on the Varsity team who convinced the coaches to move her up.	She had always been a workout kid. I got a call from the field once, asking if I knew the kid who had climbed the fence to get in at night. She was awful at the indoor game because she couldn’t dive or play as aggressively. She got to UNC, but was at the bottom of the roster. And she got cut by USAFH.	She called me, said she didn’t make the travel team. I said, what do you want to do – work harder and get on the A team or fly home. She said I’m going to watch the others more, see what they are doing that I’m not. When she came home, she asked me for one-on-one coaching, to tweak things she wanted to work on. She knew where her weaknesses were.

USAFH developmental player	I did gymnastics when I was little. Then I got sick and didn't want to continue. My parents said I had to do something, so I tried field hockey in the rec league. I liked it.	I joined a club. My first tournament, I won player of the tournament for the age group, then again the next year. I think I was 8 or 9. My parents would tell me the referees asked them about me.	I liked winning. Sometimes the players on my team didn't seem like they were there for field hockey – more for the social aspects. My rec coach really liked how I played. The club coach told my parents I was too small to play up in age. My teammates were trusting me to get the job done.	I played volleyball and basketball for a season in middle school. By then, I was all about field hockey. I was finally playing way up in age groups and felt like I was doing all the work. I got chosen to take an 8-second shootout to send us to the national tournament and made all my shots, even though an older girl didn't. I continue to work on my all-around game all the time.	
Adam Lambert / Parents	<i>He didn't fit in. He tried sports but didn't like them. He started acting out (performing).</i>	I joined a children's theatre group and felt like these were my people. <i>One day he got on stage and started to sing – none of us knew he could sing.</i>	As I got older it became apparent that I was getting attention for this, more than the other kids. I love attention. It became like a medicine to me.	<i>He started getting jobs making money for singing.</i> I was a cast member of Wicked.	<i>Then he called and said, "I have to quit my job." I asked how much American Idol was going to pay. Adam said, "they don't."</i>
NDM researcher	I signed up for a Naval Reserve program in high school because I really didn't know any other options – no one in my family had attended college. It was going to pay for a medical technology associate's degree.	My boot camp instructor asked me once, "Why are you here?" When I got to community college, my chemistry instructor literally said the same thing to me. I realized I should be going for my bachelor's.	I remember being in a sociology class and answering a question that no one else seemed to understand. I felt like I was pretty good at questioning what I was learning by using my own life experiences.	I made it to a top-tier social science school. I didn't really appreciate what it was until I got there. But I felt like I was holding my own compared to Ivy League peers.	During a review of one of my papers, my professor told me I was an "unguided missile" – meaning I had a lot of passion but lacked skill. After a few days of self-doubt, I realized I needed to figure it out. I spent the next year reading more than I ever had.

THE ROAD FORWARD

We believe our draft model offers a viable bridge over the gap in NDM research regarding the motivation for becoming an expert, albeit one that will certainly require extensive testing and revision. We invite the community to do just that by using naturalistic methods to dig into the experience of experts and those on the path toward developing motivation to achieve expertise, to test whether the stages hold or revisions are necessary.

In the meantime, we believe the model holds promise in meeting one of the requirements set forth by the NDM community for accelerating the achievement of expertise:

While researching the notion of acceleration to the highest levels [of expertise] is perhaps outside the scope of the immediate needs of many industries, measurement appropriate to this level is needed if ideas of proficiency and expertise are to be transported into the context of job or role selection. Across a broad spectrum of jobs, aspects of proficiency that distinguish the levels (e.g., *motivation, etc.*) *might be measured* in addition to the existing performance measures, and *individuals tracked over time*. This would, ultimately, generate an empirical base and that might be of use in developing refined selection procedures (Hoffman et al., 2013; p. 167).

We agree with the goal but suggest a reframing of what is needed. We suggest that the aspects of motivation could indeed be distinguished by levels – i.e., stages – and that individuals could indeed be tracked over time. However, motivation as a general factor should not be *measured*. Rather, individuals' *experiences* could be catalogued such that their placement along the developmental pathway could be determined. Experience could be elicited with a focus on the defining aspects of each stage. Stage 1 exploration would look for evidence of preconizing events of seminal importance, as well as the basis of evidence on which the preconizer was believed to have based their proclamations. Stage 2 exploration would look for evidence of task completion that demonstrate increasing difficulty, the rationale for the value judgements of the tasks, the emergence of new metrics, and evidence of seminal preconizing events and the performers analysis of such events. Stage 3 exploration would look for de-commitment, pursuit of and connectivity to accoutrements and symbols and enabling activities and tasks, evidence of close match between perceived performance and actual performance. Stage 4 exploration would look for signals of submission, including most importantly the emotive shift between stage 3 and 4. At each stage, expressions of the concomitant feelings should also be captured.

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REFERENCES

- Athens, L. H. (1995). Dramatic self change. *Sociological Quarterly*, 36(3), 571-586.
- Athens, Lonnie H. (1997). *Violent Criminal Acts and Actors Revisited*, University of Illinois Press, Urbana, 1997.
- Athens, Lonnie H. (2015). *Domination and Subjugation in Everyday Life*, New Brunswick, Transaction.
- Athens, Lonnie H. (2017). *The Creation of Dangerous Violent Criminals*. (Second, Expanded Edition) Transaction, Imprint of Taylor & Francis, N.Y.: N.Y.
- Athens, L. and Ulmer, J. (2003). *Violent Acts and Violentization: Assessing, Applying, and Developing Lonnie Athens' Theory*, JAI Press (an imprint of Elsevier Science): New York and London.
- Blumer, H. (1986). *Symbolic interactionism: Perspective and method*.
- CDC. (2019). Preventing Youth Violence: Opportunities for Action. Available at www.cdc.gov/violenceprevention.
- Crandall, B., Klein, G., Klein, G. A., & Hoffman, R. R. (2006). *Working minds: A practitioner's guide to cognitive task analysis*. Mit Press.
- Ericsson, K. A., Krampe, R. T., & Tesch-Römer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological review*, 100(3), 363.
- Feenstra, R. H. (2010). *The Role of creativity in naturalistic decision-making environments: A systems approach* (Doctoral dissertation, University of Nevada, Las Vegas).
- Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., & Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The Adverse Childhood Experiences (ACE) Study. *American journal of preventive medicine*, 14(4), 245-258.
- Hoffman, R. R., Ward, P., Feltovich, P. J., DiBello, L., Fiore, S. M., & Andrews, D. H. (2013). *Accelerated expertise: Training for high proficiency in a complex world*. Kindle Version.
- Klein, G., Ross, K. G., Moon, B. M., Klein, D. E., Hoffman, R. R., & Hollnagel, E. (2003). Macrocognition. *IEEE intelligent systems*, 18(3), 81-85.
- Klein, G. A., Calderwood, R., & Clinton-Cirocco, A. (1986, September). Rapid decision making on the fire ground. In *Proceedings of the Human Factors Society Annual Meeting*(Vol. 30, No. 6, pp. 576-580). Sage CA: Los Angeles, CA: Sage Publications.
- Moon, B. (2002). *Naturalistic Decision Making: Establishing a naturalistic perspective in Judgment and Decision Making Research*. Advanced Decision Architectures Collaborative Technology Alliance cooperative agreement DAAD19-01-2-0009, US Army Research Laboratory.
- Moon, B., Wei, S., & Cox, D. (2004). Cognitive Impact Metrics: Applying Macrocognition during the Design of Complex Cognitive Systems. Paper presented at the Proceedings of the Human Factors and Ergonomics Society 48th Annual Meeting, New Orleans, LA.
- Mosier, K. L., & Fischer, U. M. (2009, June). Does affect matter in naturalistic decision making. In *Proceedings of the 9th Bi-annual international conference on Naturalistic Decision Making* (pp. 99-104).
- Podgórski, T., & Pawlak, M. (2011). A half century of scientific research in field hockey. *Human Movement*, 12(2), 108-123.
- Popper, K. (1957). *The poverty of historicism*.
- Wai, J. (2016). Crossing disciplinary boundaries to better understand expertise. A review of Fernand Gobet's book *Understanding expertise: A multi-disciplinary approach*. *Intelligence*, Volume 57, pages 64-65.
- Wilkins, N., Tsao, B., Hertz, M., Davis, R., Klevens, J. (2014). *Connecting the Dots: An Overview of the Links Among Multiple Forms of Violence*. Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention Oakland, CA: Prevention Institute.