Developing Skill. The influence of individual differences.

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The influence of individual differences, risk, **affordances** and developing perception-action coupling

Why was it 'Too hard for George Smith?' Sports with serious consequences and high levels of risk mean that the development of perception-action coupling is more about the wider perceptual field and decision making. This blog looks at how levels of perceived and real risk will influence the type of practice you do.

Winters in Llanberis (North Wales) can feel a bit like living in Mordor. Steep mountains hide the weak winter sun and the scars left by the slate quarries add to a landscape of stark desolation. So, like many of the local climbers, my winter evenings were often spent at the Beacon Climbing Centre in the bright, vibrant and social space of their indoor walls.

One evening at the Beacon, I bumped into an old friend and university colleague. While we chatted, he asked what boulder problem I was working on. I happily showed him a very balancy, slightly crouched traverse, with small holds. My friend had a go and was very disheartened when he could not pull onto the first move. He laughed. Then said that it was so frustrating that despite being able to climb multiple grades harder than I could on any rock or ice outside, there was no chance that he would ever be able to do this particular boulder problem. He was a mountain guide and very proficient rock climber, but for him, this was a rare visit to the wall and he was there to lead climb with an old friend. He concluded that he was too tall to squish into the space and not flexible enough to make the moves.

Then he told me a great story. He asked if I remembered Crooky (Martin Crook) from our time at university. Of course, who forgets Crooky? Well, Crooky climbed a lot with his friend Big George (Smith). Although both brilliant climbers, Crooky would often spend ages working routes, then George would have a go and cruise them. Because George was so tall, he could reach extra holds and often miss out crux moves. Then, in 1994, Crooky put up a short route with sketchy gear (now a popular high-ball boulder problem). The route, on Craig Fawr in North Wales, is described as simply 'a striking finger crack,' but is in fact, a *very thin*, striking finger crack. So thin, that when Big George first tried it, he couldn't fit his fingers in it. As a jest, a mutual friend of theirs called Jim Perrin then persuaded a gleeful Crooky to name the climb 'Too hard for George Smith!'

My friend said the story highlighted how much climbing was influenced by the movement opportunities made possible (afforded) by different physical attributes, like height, strength and flexibility. Routes, he told me, present different opportunities (affordances) to different people. He couldn't do my boulder problem because he was not flexible enough, and too tall. However, I was not entirely convinced. It was a good story, but not the whole story. Of course, our physical attributes are very influential, but how often are they as absolute as the case of George's big fingers? A lifetime of guiding and climbing risky routes with high consequences develops very different awareness to affordances (perception-action coupling) than working boulder problems in a warm, bright and safe indoor wall. And my friend did not boulder, he never had.

In part 2, we described working a boulder problem as practice that necessitates spending a lot of time in the 'ugly zone' of developing movement patterns. Trying, failing, exploring, failing again, until the rock becomes intimately known. Adam Ondra (one of the best climbers in the world), commenting on his training schedule (in July 2018), said: "Training for climbing should most of all consist of climbing itself… In bouldering, it is the freest as it is simply about figuring out the craziest moves, learning new movement patterns, sometimes with a training partner as well."

In traditional climbing, this is not the case. The affordances are very different, leading to a different style of practice. Serious consequences and high levels of risk mean that the development of perception-action coupling is more about the wider perceptual field and decision making, rather than pulling 'crazy moves.' Reading subtle nuances in the weather, rock and ice features, environmental stability, gear placements, and analysing cumulative risk. Each move is only made once, not explored, pushed to fail, or repeated.

Nathaniel Fuller controlling the fear.

Nathaniel Fuller controlling the fear on the lead at West Cape Howe, Western Australia. © Dane Ehm Photography

Practice in this environment leads to the development of different perception-action coupling, hence my inability to climb as skilfully on traditional mountain routes. Outside, I was not as experienced or skilful as him. When leading I was very happy, comfortable being in control, confident in my attunement to the wider environment and making decisions in complex situations. But seconding was another matter altogether. After some early bad experiences, I could get stuck trying to make simple moves on relatively easy grades, due to an irrational lack of confidence in someone else's ability to safely lead the route. This changed my ability to perceive and utilise the affordances normally available to me. I decided that just as I could become more skilled at traditional climbing by practising in higher anxiety contexts, it would have been possible for my friend to climb my boulder problem. He just needed to spend some time loosening up his knees, being out-of-balance, slightly crouched and trying crazy moves. And Big George? Well, apparently, he still hasn't climbed 'Too hard for George Smith.' So I guess some individual constraints just can't be overcome…

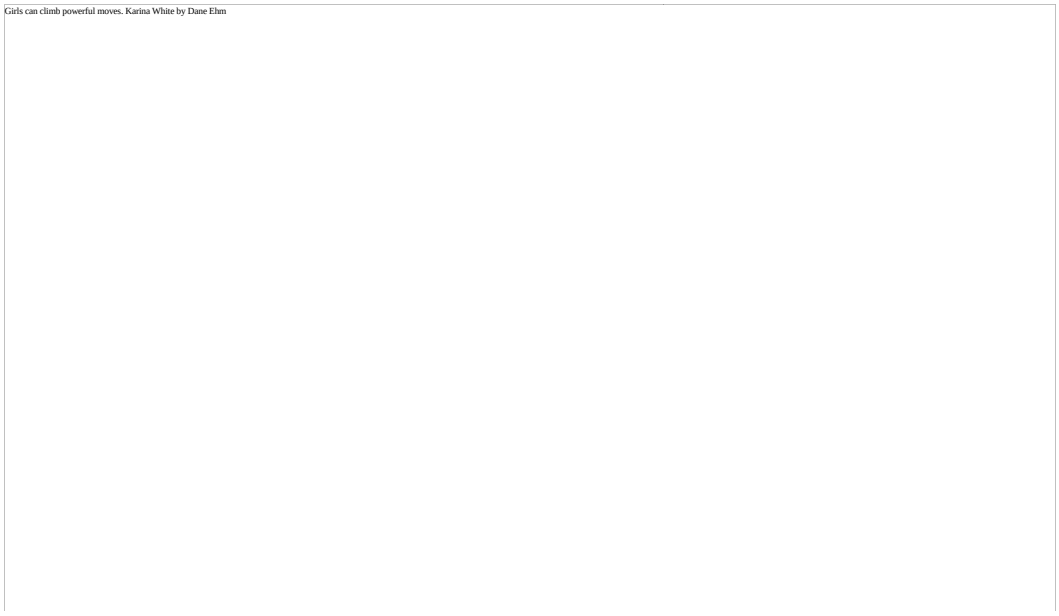
Opportunities for exploring solutions

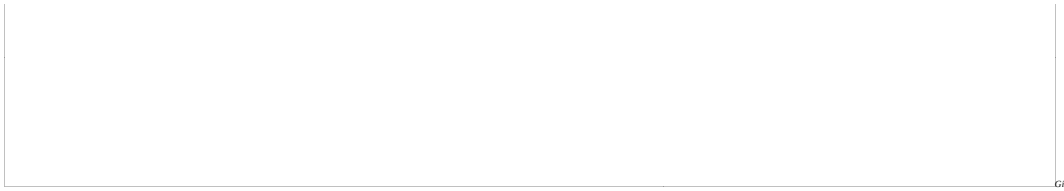
What does this mean to us as instructors and coaches? Adventure sports are outcome orientated (you try to ski, bike, paddle or climb your line successfully), rather than form, like gymnastics or figure skating (although the outcome is still very important).

Adventure sports require a mixture of balance and coordination, with an ability to 'read' the environment. Different levels of risk change how these are perceived. This resonates with the way that Sam practised his climbing in part 2, Adam Ondra's training descriptions, and the experiences of the elite performers in part 1. Both Aled and JD described the opportunities for movement (or affordances) that their respective environments were offering them. Affordances that, to me, were totally alien and did not exist!

Using Newell's (1986) model, we can describe learning as developing the ability to organize various body parts (i.e. neurons, muscles and joints), in coordination with each other (known as co-coordinative structures, or coordination patterns), and in response to opportunities for movement (affordances), that seem possible from perceptual information picked up from the environment. In other words, this describes the development of perception-action coupling. That elusive 'feel!' Instead of assuming an internal focus of attention, we focus on the person-task-environment interaction and allow our movement system to self-organise. Improving this interaction requires developing a keen attunement to affordances, through lots of exploration. There is no single 'correct' way to solve perception-action problems. We bring our own set of individual opportunities and constraints to each situation, and these continue to evolve through time (e.g. as new information becomes available, as we move, become increasingly tired, or nervous).

Girls can climb powerful moves. Karina White by Dane Ehm





*Girls can do powerful moves. Karina White showing that girls can climb powerful routes on F*ck the Law (25), Kalbarri, Western Australia. © Dane Ehm Photography*

In dynamic environments, no two performance movements or decisions are likely to be identical. This repetition (of outcome) without repetition (of movements), is achieved by practising in a way that encourages problem-solving and movement variability. Extensive practice, by experimenting with lots of movement solutions in realistic environments, increases the development of perception-action coupling. Some of which may be completely implicit and sub-conscious. This is the ability to 'read' the environment and respond appropriately. As a result, practising 'trying to repeat perfect technique' will not develop perception-action coupling!

For improving perception-action coupling, we need to focus on two key aspects:

1. Developing the self-organising adaptive coordination patterns needed for our particular sport;
2. Developing an ability to identify and use relevant perceptual information in the performance environment.

Representative Learning Design

So, this is the important bit. The two parts of skilled performance need to be learnt together – perception and action! As humans, we have evolved to learn (and adapt) movement patterns within an environment; not to learn a movement pattern first, then try to impose it onto the environment after.

In summary, we learn to move skilfully by developing coordination patterns that are linked to perceptual information in the environment. This perception-action coupling requires a focus on all relevant information (e.g. visual, auditory, haptic [touch and pressure], kinaesthetic) that can inform movement options. We each have, and continue to develop our own unique movement options. These are constrained by a mixture of our physical attributes, what we perceive, what we think we can do, and what we want to achieve. When we focus on achieving a goal, and the relevant perceptual information, our movement patterns 'self-organise' within the real-time constraints presented at that moment.

To learn adaptive skills, like those required in adventure sports, we need to explore lots of movement solutions, in an environment that is real (i.e. authentic with regards to the perceptual information available). This includes 'affective' or emotional states and stresses that are likely to be experienced during a performance. To develop full-body coordination, we need to practice in a way that preserves full-body movement. This is referred to as a 'Representative Learning Design' or RLD. In the final part of this series, we're going to pull this series together, exploring how we become attuned to information that is relevant to us, and how to structure practice in a way that defines appropriately sized (and representative) 'search spaces' for exploring movement solutions and decision making.

This article was written by Marianne and Sam Davies.

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tags : development, skill, risk