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Fusion of technological objectivity into the underlying anarchy of elite snowboarding: insight from the Australian national snowboard coach

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1. INTRODUCTION

This interview was focused upon gaining practice community insight into the potential of microtechnology and subsequent automated objectivity to assist coaches and competition judges with performance assessment during elite half-pipe snowboarding. The sport of half-pipe snowboarding has, however, traditionally assessed performance during training, free riding, and competition by purely subjective measures, and until recently, has had very little to do with sport science and the focus of objectifying performance parameters associated with rigorous scientific inquiry. We previously demonstrated a strong relationship between objective key performance variables, such as air time and degree of rotation (assessed using video-based analysis), and an athletes' subjectively-judged score during elite half-pipe snowboarding competitions. Video-based analysis, however, requires labor-intensive, manual post-processing of data and is associated with a large time delay in information feedback. As such, it is theorized to have limited potential for the feedback of objective information to snowboard athletes, coaches, and judges. The authors have therefore worked alongside numerous collaborators from the Australian Institute of Sport (AIS; Canberra, ACT, Australia), the Olympic Winter Institute of Australia (OWIA; Melbourne, VIC, Australia), Griffith University (GU; Brisbane, QLD, Australia), and Catapult Innovations (CI; Melbourne, VIC, Australia) to develop a system of automated objectivity based on tri-axial accelerometers and tri-axial rate gyroscopes that can calculate air time and degree of rotation during half-pipe snowboard runs. The concept was originally focused on enhancing current training protocols, but has also shown potential to support judges in assessing athletic performance during elite half-pipe snowboard competition. Although there is a potential benefit to using

systems of automated objectivity within the sport of snowboarding, there are also potential drawbacks associated with objectifying a sport that prides itself on providing a platform that allows freedom of expression and the capacity to showcase athletic individuality. It is believed that the integration of any form of objectivity into a sport, such as half-pipe snowboarding, should be conducted, while allowing key practice community members control over the overall direction. This 45-min interview was conducted by Jason Harding (AIS sport scientist) with Ben Wordsworth (the Australian national snowboard coach currently affiliated with the Olympic Winter Institute of Australia) in between surfs at Manly Beach, New South Wales, Australia on Wednesday, 1 October 2008.

Ben Wordsworth is the Australian national snowboard coach and currently works for the Olympic Winter Institute of Australia. Picking up snowboarding at the age of 16, he went on to become a sponsored competitive snowboarder, winning numerous national half-pipe and boarder-cross snowboard titles until he retired from regular competition at the age of 21 to focus on coaching. His coaching career began in the US ski resort of Mammoth Mountain where he was a club snowboard coach for 4 years. During his fourth year of coaching in Mammoth Mountain, Ben received a phone call from Geoff Lipshut (chief executive officer of the Olympic Winter Institute of Australia). The phone call came shortly after the 2002 Winter Olympics that were held in Salt Lake City. Geoff was focused on initiating an Australian national half-pipe snowboard program geared toward success at the 2006 Winter Olympic Games. The phone call saw Ben move on to become the first Australian national snowboard coach and he has filled that role for the past 5 years; coaching snowboard disciplines, such as half-pipe, boarder-cross, and parallel giant slalom. Ben took a total of nine snowboard athletes to the 2006 Winter Olympic Games as part of the Australian national team, and is now focused on the 2010 Winter Olympics in Vancouver, Canada. Vancouver will signify his second 4-year Olympic

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Figure 1. Jason Harding (AIS sport scientist) left and Ben Wordsworth (Australian national snowboard coach) right discuss the potential benefits, the potential drawbacks and the possible difficulties of integrating technologically based automated objectivity into elite-level half-pipe snowboarding. Image: Heidi Barbay 2008. Reproduced by kind permission of www.AnarchistAthlete.com



Figure 2. Ben Wordsworth (Australian national snowboard coach) preparing the base of an Australian boarder-cross athlete's snowboard deck prior to the finals of the Ski and Snowboard Australia (SSA) and Federation Internationale de Ski (FIS) sanctioned World Industries Australian Series Snowboard Boarder-cross competition. Mt Hotham August 10th. Image: Jason Harding 2008. Reproduced by kind permission of www.AnarchistAthlete.com

block as the Australian national snowboard coach. Ben anticipates taking approximately eight snowboard athletes into the 2010 Winter Olympics competing in a range of snowboard disciplines. As the national coach of a snowboard program running on limited athlete numbers and a seemingly small talent pool, Ben has taken to elite-level coaching with an open mind regarding innovative training practices. With his background in competitive snowboarding, elite-level coaching, and his recent roles as a snowboard competition organizer, he is well positioned to comment on the potential benefits, potential drawbacks, and possible difficulties associated with integrating automated objectivity into a sport, such as half-pipe snowboarding.

2. INTERVIEW

Jason Harding:

On top of all your coaching roles within the Australian snowboard program you were just recently the brains behind the new National Half-Pipe competition held in Perisher Blue Ski Resort. How did that go?

Ben Wordsworth:

I wouldn't say I was the complete brains behind it, but, you know, we wanted to do something different. It has been a while (about 4 years) since we have had a nationals in Australia and we believe [an event like this] is important for the future of the sport, [especially for] the development of our young athletes and [for Australian snowboarding] to move forward and into the future. So we set up an event which was an FIS (Federation Internationale de Ski)-sanctioned event and had all the top riders in Australia there competing. Hopefully over the next couple of years, we will [expand on the] event, get some international riders out so it becomes a stop on the tour, and then hopefully in the future, [the event] will become Continental Cup level and possibly [a major part of] the southern hemisphere tour. That is the plan anyway.

Jason Harding:

Sounds good. The main idea behind this interview is to get your insight into the current training and judging protocols used within half-pipe snowboarding and the potential of technological innovation to assist training and to assist judging in certain ways. [The idea] is to also get your insights into what is potentially required to ensure a concept like this, or any sort of technological innovation, works within a sport, such as snowboarding. So to start with, can you explain how snowboarding is currently judged in competition, because not many people know exactly what is going on there?

Ben Wordsworth:

Well at the moment [the judging protocol is] very subjective like surfing. There are five overall judges and it is basically overall impression. So in a roundabout sort of way, [judges assess] amplitude, degrees of rotation, style, fluidity through the pipe, and how the [athletes] are riding the transitions.

Jason Harding:

So it is like a lot of different components are combined in to the one (assessment method of) overall impression?

Ben Wordsworth:

Exactly. So every individual judge (there are five) has an overall impression of a run and they score it out of 10 so [that gives a rider] a total score out of 50, and that is how we are judged at the moment. Now it works, you know, it has worked for the last three [Winter] Olympics, so Nagano (Japan) being the first [Winter Olympic] half-pipe competition, then Salt Lake City (USA) and then Bardonecchia (Italy). Whether it is going to work in the future is arguable. The level of snowboarding and the degree of difficulty of the tricks are getting very close together. So your top 10 guys can pretty much do all the same tricks. Now [if you] use an overall impression of those riders [in competition], if they are all doing the same tricks and they are all going the same height and they are all smooth through the transition, how do you [reliably] distinguish between them?

Jason Harding:

It sounds pretty tough.

Ben Wordsworth:

It is pretty tough. Now as we move forward into the next Olympics it is going to be very tough to judge the 12 finalists. You know, I would not like to be a judge [trying] to do it that's for sure. The last Olympics were pretty unique. Shaun White (a professional snowboarder from the USA) was clearly a stand out amongst the rest of the riders. It was basically his event to lose, you know. All he had to do was ride to his potential and he was roughly about 10 points ahead of the rest of the field, and that showed through training, through qualifications and through finals. So whether he is that guy again in Vancouver, I highly doubt it. I think he is [going to be] with about 12 other riders that are equally as good, and the judges are going to have to give an overall impression on that. I think [judging that] is going to be quite difficult. Listen, it works for us at the moment. The riders (and they have a say in how the sport is judged) like it that way and they think it is a fair system. [However] how do you (reliably) distinguish between fifth place and eighth place, and how do you distinguish between fifth place and first place, you know? I think eventually we will have to have something additional to add [weight] to the judging system. What that is I do not know yet and [I do not] know how it will work with the sport.

Jason Harding:

It is pretty rider driven, isn't it, because it used to have a five-component [system], almost a gymnastics model?

Ben Wordsworth:

It did. It used to have degrees of rotation, amplitude, you know.

Jason Harding:

Like a separate judge for each?

Ben Wordsworth:

A separate judge for each and they did have an overall impression judge in there as well. Now after I think it was Salt Lake, no it was after Nagano, that was the [judging] criteria for Nagano. After that [competition] and through the pro tour coming into play, they flicked it. They thought it wasn't fair.

Jason Harding:

And the riders had a big part in that?

Ben Wordsworth:

Yes the riders had a big part in that. The riders were choosing the way they rode [in competition] to fit that criteria. Now the new criteria [*sic*] is basically like, have at it. You can show off your skills, you can show off your [aerial acrobatic ability], and show off your flair as a snowboarder, which is what snowboarding is about. There is an element of flair in there and there is an element of personal style [like surfing]. That's what the riders wanted and that's the way the sport's [judging protocol] progressed [and evolved]. Again, whether that is going to hold up in the next Olympics and in 2014 in Russia, who knows?

Jason Harding:

So that is how competitions are judged. As a coach, do you pretty much train athletes in a similar manner; is it almost like using an overall impression? You are not scoring, but you are providing feedback [to your athletes] in a similar [subjective] manner.

Ben Wordsworth:

You can break it down more in a coaching sense; it is not so much an overall impression. You can specify on one hit, one line, you know, amplitude, degrees of rotation; you can break it down

[more] in coaching. But when it comes down to it, you know, at the end of the day from start to finish, being about six hits, you just have to give an overall impression of [how a particular athlete] is riding the pipe. He is smooth through the transition. He is going the biggest out. He is doing the most rotation. He is using a combination of tricks (being forward to fakie, fakie to normal), spinning degrees of rotation up to 1080, and using all those elements. I think the way it is going to go is the athletes or the riders are going to try and bring out something no one else is doing. You know that is going to be the difference between that fifth place and that first place. So if everyone is going 1080 to 1080 and you have five guys all doing that, then it is going to be hard to judge and it is going to be hard to determine a clear winner. The riders that bring out some tricks that no one else is doing—and there are still a few tricks there that haven't been done—will be the ones that make the difference.

Jason Harding:

Yeah, we have talked about this a lot and the concept keeps on coming up here, so we may as well talk about it now. Andy Miah has written about situations like this in sport and he calls it sport's self-annihilating teleology. You have heard me present this theory in relation to snowboarding competition a number of times. Do you think this is potentially a problem in half-pipe snowboarding? You have mentioned the concept a couple of times already in this interview. What it means is that, as the sport progresses, you get more and more athletes that can perform the hardest tricks at similar execution levels and everything gets bunched up in that top level [which makes it hard to distinguish between athletes using the current performance assessment measures].

Ben Wordsworth:

And it will do. At some stage, the top 12 in the sport will be able to do every single trick, up to say 1080. So frontside, cab, switch backside, you name it they are going to be able to do it, but we are not there yet. The men [for example] have not yet dived into switch backside tricks yet. It is still an unknown, and they also have not gone into double flips, which are also still a bit of an unknown. The skiers have gone into double flips, which is a pretty big manoeuvre when you are 12 feet out of the pipe. I have [video] footage of a skier doing it in Snow Park (New Zealand's premier snowboard park). The snowboarders have not gone down that road yet, at last not in the half-pipe. They have gone down that road off jumps and in the backcountry, but not yet in the half-pipe. So we are still a little bit away [from a situation like that described by the self-annihilating teleology]. How fast it takes to get to that point will then determine how the judging criteria [adapts] and how we train our athletes in a coaching environment.

Jason Harding:

I think there are a number of different ways in which you can prolong it (the situation where increased numbers of athletes can obtain the sport's highest scores) and we will talk about maybe one or two potential methods. If you got to a point where you had 20 athletes who were all as competent as each other and you pretty much could not [distinguish] between them using a subjective measure, one way [to prolong the sport's self-annihilating teleology] is potentially using technology and automated objectivity [to reliably distinguish between similarly competent riders], but another [method] might be as simple as increasing the pipe



Figure 3. Ben Wordsworth (Australian national snowboard coach) hanging out with two of his national snowboard athletes prior to the finals of the Ski and Snowboard Australia (SSA) and Federation Internationale de Ski (FIS) sanctioned World Industries Australian Series Snowboard Boarder-cross competition. Mt Hotham Ski Resort August 10th. Image: Jason Harding 2008. Reproduced by kind permission of www.AnarchistAthlete.com

length from 200 m to 300 m. All of a sudden that sort of [development] would spread the field out again because [for one reason] not everyone can maintain focus for 300 m.

Ben Wordsworth:

And that's a good thought process of how it could change the sport. You know it is going to bring an element of endurance into [the sport]. You take a six-hit pipe into a 12-hit pipe, you are talking [almost] twice as much [snowboarding] and twice as many tricks, and you are going to have to learn those tricks back to back for 10–12 hits. So I think that would be the last option, you know. I do not think the resorts around the world are [willing] to go down that road and build bigger, longer half-pipes [that are going to cost them] more money. But then again, it also [begs the question] of whether or not we are going to be competing outdoors forever. You know, there has been a lot of talk about indoor events and man-made pipes, and I think that will maybe come into play a little bit as well.

Jason Harding:

The other way to get around [a situation, such as that described by a self-annihilating teleology] is automated objectivity and this is one of the main things I wanted to talk to you about. You know, you have been a part of this and we have trialed different ideas and different technology over the past few years [together], and we have used things like tri-axial accelerometers and rate gyroscopes. The main things we were looking at were air time and degree of rotation throughout half-pipe snowboarding runs. The idea is focused on those two things: air time and degree of rotation, and objective information on both, because it is believed that those two [variables] have a fairly large impact on an athlete's overall score [during competition]. So in terms of objective information on things like air time, let's say average air time across a whole half-pipe run and let's say average degree of rotation across a whole half-pipe run. How much of an impact do you think things like that have on competition success?

Ben Wordsworth:

Well from a coaching point of view and how we have used it and the information I have received from it, I think it is a great

idea. Being able to measure air time over a half-pipe [run] is key information when you are coaching. You know if you can tell an athlete that they have had x amount of air time on run one and they have had x amount of air time on run two and this is the difference and these are the reasons why. For coaching athletes and moving into the future and rather than just relying on weight of numbers and your talented and your not, I think it is brilliant technology; same with the degrees of rotation. We can [however] kind of see that with the naked eye, well not the naked eye, the professional eye, you know. Coaching staff can see the degrees of rotation. We know just by going you need these tricks in your run to get this score. Now having data come back giving us the same information, I just do not know [if it is of any great assistance]. But as for judging and how it can be used in judging, like I said before, we are going to get to a stalemate a little bit with judges probably not wanting to judge, you know, because of the way the system is. I know the judges that are going into Vancouver are looking at that day going, I do not want to be there, because they are [required] to make a [major] decision on a completely subjective view about who is going to win, you know. And if they do not get it right, we are talking about a gold medal. So it is a really hard thing to do. So if you are looking at this sort of information to give to the judging panel of an Olympic Games, I am sure they would take it on board and go, thank you very much this is unbelievable. Even if it is just [focused on] air time. Even if you have one bit of information that comes into those five judges saying [for example] Shaun White got this amount of air time and Antti Autti (professional snowboarder from Finland) got this amount of air time and it goes into their overall judged score. Maybe that would make it a little bit fairer.

Jason Harding:

I agree, they (judges) are trained to pick these things up and a lot of times you can say this guy went bigger and you just know that by looking at it, but sometimes [the differences between air times and amplitudes] are tight and sometimes its 200 m away and sometimes it can get tough. Coaches are trained and have experience [in the same manner]. What [however] do you think of the idea that instead of relying on the continual assessment of air time and degree of rotation in a [subjective] manner you allow technology to take care of it? Then maybe this concept could be beneficial to both coaches and judges. Allow technology to take care of that sort of stuff [objective measures] and focus in on the subjective components of style and execution. I am thinking it could allow coaches and judges to focus in more on the stylistic components of the sport.

Ben Wordsworth:

I agree with that. I have judged and taken part in judging courses. To sit there at the bottom of the pipe and what they currently do is watch the first air and then they put their head down and write something and then they look back up. So in the two or two and a half seconds it takes you to get from wall to wall or lip to lip they are missing something every time. You can miss things. And to watch those six hits or eight hits [whilst judging] is extremely hard to do. You have to be on it the whole time. So listen, I will be perfectly honest: those guys get it wrong. From week to week they get it wrong. If it is not myself, it will be another coach that will be in the judges tower at the end of an event [asking the judges] to justify this score because we see it as well. We see one rider or one of our riders and we see other riders and we see

amplitude and we go well, how can you put him there when he clearly went 3 feet lower than these other riders? I mean, it happened in New Zealand in the first World Cup [this year] to one of the American kids who did not make the final and he certainly should have made the final. But you are relying on a judge sitting at the bottom writing down a score and they do get it wrong.

Jason Harding:

I have talked to a number of World Cup judges and some of the main ideas that kept coming back were one, it (automated objectivity) would be handy in a protest situation like you just described. You have a coach in there asking why a certain athlete did not make it through. If you could put up an objective value and you knew it was accurate and reliable [then you could state] he did not go through because he did not have the air time. The other idea was [a concept like this would be beneficial] in bad light, you know, when you have a 200m pipe. I have seen some competitions and I am sure you have seen some competitions where it is pretty hard to see the first hit, maybe the first two hits. It could possibly be beneficial in those sorts of environments and those sorts of situations.

Ben Wordsworth:

I think it is a great idea if a judge could just sit there a look up at the pipe and just watch the tricks and watch the style and out at the bottom comes data on he got this amount for air time and he did this amount of rotations and all that the judges look at (he has looked at the overall picture), but he has [been able] to see everything. He has seen his transition at the bottom, he has seen his take off, how high he has landed on the transition, and he has seen the style of the rider. It could definitely work, you know, but how accurate that number that is going to be spat out at the bottom is going to be is arguable, you know [and of the utmost importance]. And will that change the sport too, you know? You are a surfer. You have to take it this way. Would you put this onto ASP tour (Association of Surfing Professionals World Championship Tour)? Is this the way that [professional surfing] is going to go? Because some would say that the top 10 surfers in the world are all relatively the same level. How do those guys distinguish between how one surfer is riding and another guy is riding? How close is it, you know? Are the right people winning every week?

Jason Harding:

They use a subjective format for judging surfing as well. If you were going to measure anything, I think the accuracy of it and the reliability of the numbers you are providing has to be pretty good; it has to be really good actually, especially if you are going to start [using it] for judging purposes. I have reservations on [a concept like this] being used to judge an event, because I think these sorts of things can change the sport. One of the main points [I have heard regarding this concept] is that it is the subjective components of style and execution that make the sport what it is. It is always going to be a major part and I think some people will always, even in a coaching situation, worry that you are going to suck some of that [style and freedom of expression] out of the sport and it is going to be replaced with boring automated objectivity.

Ben Wordsworth:

Which is [a path] we do not want the sport to go down. We do not want to go down that road. But I support this and what you're doing and these ideas, because what I might think looks

cool and what I might think is stylish might be different to what you think looks cool and stylish. So I can guarantee you have got five judges at the bottom and one might think differently to the guy next to him (regarding what looks cool). At the end of the day, a subjective judging system is sometimes what looks cool in your perception and what looks cool to the next guy.

Jason Harding:

A couple of other points that kept coming back from judges and some of the athletes and you coaches as well was that if something like this was ever actually used to provide a component of a score, that it can produce a negative [situation] where athletes actually change the way they ride and that you can [potentially] change the sport. One [aspect that kept being commented on] was that people do not like the 'spin-to-win approach', so if you put something up there like degree of rotation, all of a sudden you will have athletes spinning their way down the pipe, and the style and amplitude [consequently] drops out of their runs and all of a sudden we have a totally different ball game.

Ben Wordsworth:

Yeah, because the athletes are gearing themselves towards the system to get the best result. The classic example was Shaun White at the [2006 Winter] Olympics in his victory run doing probably one of the best frontside five stale-fishes anyone has ever seen. It is a small trick, you know. It is a front side five in the pipe, but it was done so perfectly and with so much style that it would probably beat a front side nine (a trick with much more degree of rotation) that did not have that loft (amplitude or air time) or that style about it. So you know it is going to be a hard one because we have already come from there, we have already come from that [sort of] judging system. To go back to it, I know all the judges would like it because it is easy for them. Whether the sport is going to allow, that is another question, or [even more so] whether the riders will allow it [is another question].

Jason Harding:

Yeah, as you stated before, they (the riders) seem to have a fairly big impact on how things are run and that the sport itself and especially the competition judging side of it do seem to take into account what the athletes and the riders actually value and the judging [protocol] is based around that. I actually heard something similar [being undertaken]. It was either a World Cup event or some [professional] event in Stoneham. I think Swatch was a sponsor [of the event]. I am sure I heard something about [Swatch] providing an extra award for highest amplitude. I watched a DVD on [the competition] and they never explained how they did it and they never showed the results with that extra part of the competition. Did you hear anything about that or did you know anything about that?

Ben Wordsworth:

I have heard of events that do it, like highest air. They do it a lot with quarter-pipe events, not so much with half-pipe events, [providing awards for] highest air and best trick. How they are measuring it, I do not know. It definitely would not be done with microtechnology. It is probably done like the rest of the sport is done: by some person or persons with a subjective view going [this athlete has achieved the highest air].

Jason Harding:

I was thinking maybe [they used] video, but the problem with video is that there is always a time delay in getting that

[information back to the competition organizers and judges]. You have to capture it, digitize it, get your clock out and calculate [information off that video] before you can come back and [provide a result].

Ben Wordsworth:

Yeah, and it is something this technology could aid with when you are talking about different events and different components of events. If you are talking about having the biggest air of the day or having the best trick or the [biggest] degree of rotation, it could definitely come into play.

Jason Harding:

You were a big part of the event we ran last year, the AIS Micro-Tech Pipe Challenge event. That had components of highest average degree of rotation, highest average air time, and we had a separate component where we had the athletes complete two runs with one hit per run focused on the highest individual air time. Do you think those sorts of [additional components] can work in elite-level competition? Do you think they can provide something extra to the event or do they detract away from the sport itself?

Ben Wordsworth:

I do not think they detract away. I think that if [something like that] is run as a separate event or as a component to an already existing event, then yes [I think they are fine]. You know, money talks within the sport, so if you put up prize money, they will come. It has [nothing] to with what they are doing or how they are doing it. At the end of the day if there is prize money, there you will find, especially in snowboarding, they (the riders) will come and do it. That was the same with that event. You said how are we going to run this, how are we going to get the top riders in Australia to show up at this event, put an accelerometer on them, and we are going to have a criteria [*sic*] set out. [My response was] let's get some money and they will come. They do this at the elite level too, you know. Athletes, high-profile athletes compete at big events like the X-Games, like the US Open for the prestige of winning the event and also the prize money that goes with it. So if any technology that gets put into the sport to run an event or run a separate event—as long as there is a prize money component—the snowboarders or the athletes will buy into it for sure.

Jason Harding:

Just backtracking to coaching and microtechnology again; just recently you showed me that you have been playing around with taking notes on how many 360s and how many 540s and how many 720s your athletes do [in training]. In a way, you are bringing some form of objectivity into your coaching method.

Ben Wordsworth:

Yeah, we are not telling anyone about that one (laughing).

Jason Harding:

Oh, are we going to cut that bit out?

Ben Wordsworth:

(Laughing) No it is all good.

Jason Harding:

Because this is sort of where the technology is at right now; you can get a summary of exactly how many 180s 360s 540s, 720s and so on an athlete did within a run, within a session, within a whole day, and alongside that [you can have the] air times as well. That's the whole idea behind [automated] objectivity.

Ben Wordsworth:

And that is where I am coming from with it as well. Basically snowboarding coaching has, you know, it has not [hit a] plateau, but it is basically the same as judging. You know you are standing at the bottom, it is very subjective; there is not a lot of [objectivity] and data, except video to backtrack and keep a timeline of the progression of athletes and also the progression of athletes towards success or [otherwise]. So about 6 months ago, about 2 years out from the Olympics, I started keeping track of my athletes especially, but I am also trying to keep track of other athletes in the amount of time they are training, the days, the time, the tricks that they are doing, the number of tricks to get some data on how that is going to play out over a 2-year period. So if we have [an Australian athlete] doing this amount of training in the pipe, outside the pipe (dry-land training), this amount of front-side fives, this amount of front-side nines and he gets, say, fifty at the Olympic Games, that is going to give us an idea on how to set up future training camps and future preparation into the Olympics. Now if he goes through and gets sixth or a gold medal or whatever, then we will get the same information.

Jason Harding:

And it seems like a good way to track an athlete's performance progression.

Ben Wordsworth:

It's a good way to track. In a smaller view of that, I did it for a camp we ran and I did it for another camp about 6 weeks after it. Now the amount of data [in terms of number of runs and specific tricks practiced during training] collected from the second camp was significantly lower than the first camp, and clearly the riding was not as high a level at the second camp, and the [subsequent] results at the World Cup were not what we expected. [In terms of training] the amount of the tricks practiced were lower, the amount of time in the pipe was lower, so in just that small snapshot, whether it was just the way it panned out or whether this is going to be a trend we are going to see, we got a bit of a picture of how it is going to play out. So as we go through the next 13 months hopefully the training camps [allow us to get] the training hours right, the periodization right going into the events, the amount of tricks they are doing right, then they should get the right results.

Jason Harding:

And without your objective monitoring you would not really have that information. If you do not have some [sort of objective information] to compare back with.

Ben Wordsworth:

Well I have always kept a journal of a rough idea of what we are doing and how much we are doing [in training]. Now I am just fine tuning it so we can have clear numbers. Now this might be out a couple of hours [or a couple of tricks] here and there over a 12-month period. That is not really going to matter, as long as we can narrow it down and get close enough. And this is also a tool for us when coaching the development athletes because we can go well here you have an athlete and he did this amount of work over a 2-year period and he got this result at the Olympic Games. If we do this much work over a 2-year period, and you are just as talented, this is where [the kind of performance level and associated success] you are heading towards. After Vancouver, if I continue, I will actually



Figure 4. Ben Wordsworth (Australian national snowboard coach) providing performance feedback to two of Australia's national snowboard athletes as they return to the top of the course via a ski lift. Mt Hotham Ski Resort July 30th. Image: Jason Harding 2007. Reproduced by kind permission of www.AnarchistAthlete.com

do this over a 4-year period. So I will start straight after the Olympics and go right through to the next.

Jason Harding:

The technology the Australian Institute of Sport and associated collaborators have been working on can do that for you, but there is obviously some problems with it and [these issues are the reason] it can not [or is not being routinely] used. I wanted to get you perception on [these issues] and [gain your insight] on what needs to be changed with these devices and how they are attached to an athlete to make it easier to use on a routine basis.

Ben Wordsworth:

It is a hard one. The biggest problem was having a device that the athletes were not comfortable with to ride in. Now whether that device was actually hindering their performance (it was that small anyway) was questionable. When you have an athlete and you put something on them that is not normally there, you are changing the environment to start with, no matter how small it is. If you are going to use this [routinely] as a training tool, you need some way to put it into their clothing so they do not even know it is there. You know they put their jacket on in the morning and this device is already in the clothing and away you go. And they do not [have] to know about it. [The idea] is very similar to what I am doing with this data collection. The athletes do not know about it yet. I have not told them about it. I have not shown them the information. At this stage it will have no relevance to their performance, because they will look at it and go why are you doing this? It is for my information only at this stage. Maybe down the track as they become more professional and as the sport evolves a little bit we will start using it a bit more, but at this stage [it is just for my use]. It is the same with the data. If you can use it purely as a coaching tool, for the coaches information and for his feedback to the athlete, then the more information we can get the better. The athlete does not even have to know about it. It [the device] needs to be built in somehow, into the bindings, into the board, into the pants or jacket; it does not matter where it goes if it still works.

Jason Harding:

It is odd, isn't it? Because I know athletes who hate wearing a heart rate monitor and it is one of the smallest and widely-

used piece of sports technology available. Lots of athletes routinely use heart rate monitors, but it is just another extra [piece of equipment] and it can feel odd until you get used to it. The device [currently developed by the AIS and collaborators] is itself not very big. It is smaller than most mobile phones and yet [the problem] seems to be that it is something that is totally foreign. It has to be attached with a carry bag. It is an extra piece of equipment in a high-risk sport that is actually placed on your lower back. Things like this can play on an athlete's mind [and subsequently affect their performance]. So I agree that it has to be smaller and incorporated into the clothing, the bindings, or the snowboard deck itself.

Ben Wordsworth:

Say you wanted to [use something like this] at a World Cup and get it onto 70 athletes from around the world. You are going to have a tough time doing that.

Jason Harding:

We had a tough time with 10 athletes during our event (the AIS Micro-Tech Pipe Challenge).

Ben Wordsworth:

We had a tough time and we are now talking about 70 athletes. The best way to do it, if you were going to do something like this, would be to get it into the [competition] bibs, because basically all the athletes have to wear them when they are competing. So if you wanted to get data [like this], you would get the device into the competition bibs and they would not even know that they were there.

Jason Harding:

It is possible. So that is pretty much one of the main [issues with routine use of this concept], the size of the device, and the fact that you have to somehow wear the equipment. I always also thought that there could be more to it with snowboarding and that it is this underlying cultural barrier between snowboarding and sport science, objectivity, and anything else that seems like you are putting too much of an effort in. Do you have any thoughts on that [component] of snowboarding?

Ben Wordsworth:

Well it is still there, you know. After all these years it is still there. Whether it is seen like this by other people [I do not know], but if you look at the top five guys at a competition, they are all friends and they all do not mind losing to each other. I do not know how long that is going to last for. It is a competitive sport, and I know if I was a competitor and I was at the elite level, I would be pissed off if I lost to the guy next to me. When we go to snowboard events at the top level, whether it be a professional event, an FIS competition, or an Olympic Games, everyone is super happy about that other person winning. Whether that is just a façade [I do not know].

Jason Harding:

Is it as simple as the amount of money on offer [for winning a competition]? The biggest amount of money I have seen offered is \$100 000 USD for first place at the US Open.

Ben Wordsworth:

Yeah the winner of the Burton Open tour gets a hundred grand.

Jason Harding:

And what about the second place getter?

Ben Wordsworth:

Nothing. Nothing.

Jason Harding:

That is where I figure this happy-go-lucky situation down at the bottom of the pipe at the end of events would disappear. Losing 100 grand [would seemingly be] a tough one to take.

Ben Wordsworth:

And it is going to change for sure because the snowboarders or the athletes [are] looking to what Shaun White did after winning a [Winter Olympic] gold medal. You know, he is making more money than anyone else in the industry right now for that one reason of winning the gold medal. He has tapped into sponsorships and endorsements that are far beyond the snowboard industry, and only a gold medal can do that for you. You know, winning the X-Games and winning the US Open is not going to get that for you; it is not going to give you the amount of exposure that an Olympic medal will. You just move into a different realm of sponsorship and endorsement. I think after the last Olympics and everyone seeing how much Shaun did and how much money he earned out of it, I think we will see a definite push towards that event especially. I think the men's half-pipe event in Vancouver is going to be way more competitive than what it was in Bardonecchia (2006 Winter Olympic Games). I think when Shaun showed up for training [at the 2006 Winter Olympic competition] everyone sort of succumbed to second place. It was like Shaun is going to win, we are just going to go for second and third. It will not be that way in Vancouver. People will want to win that medal.

Jason Harding:

Do you think the cultural ideology associated with snowboarding clashes with sport science and putting in extra innovative training to actually win these events, actually win an Olympic Games? Using things like technology in your quest to win? I have felt that there is a potential barrier to doing all those sorts of things that more mainstream athletes do [to win elite-level competitions]. Do you think there is any [weight] in that comment?

Ben Wordsworth:

I think there definitely is and we have [both] come across it. I am not afraid to say it, the US basically questioned what we were doing with this technology and how we were coaching our athletes and what we were talking about earlier related to judging our athletes. The half-pipe coach in particular questioned me about it. Those guys have a completely different system to what we use. They rely on weight of numbers. Their facilities in America are far superior to anywhere else in the world; their half-pipes, their resorts. So that is how those guys produce their athletes. They do not need any sport science to get [their athletes] to reach the top. Us on the other hand, and I am sure a lot of other small nations will go down this road, we need to come up with smarter ways to train our athletes so we can come in and compete with those top guys, and it is [definitely not achieved for us] through weight of numbers. We might have one elite-level guy to that nation's 10 elite-level guys. But if our one person is as good as one of their 10, we have a chance of getting a medal. And listen: the Chinese are going to do it. They are already doing it, and I know Canada has looked at some alternate methods of training and coaching. It is just a matter of who is going to put it into play first and who it is going to work for first. And like you have said to



Figure 5. The spoils of victory. Ben Wordsworth (Australian national snowboard coach) centre with two of Australia's elite-level athletes after the final of the Ski and Snowboard Australia (SSA) and Federation Internationale de Ski (FIS) sanctioned World Industries Australian Series Snowboard Boarder-cross competition. Mt Hotham Ski Resort August 10th. Image: Jason Harding 2008. Reproduced by kind permission of www.AnarchistAthlete.com



Figure 6. Jason Harding (AIS sport scientist) left and Ben Wordsworth (Australian national snowboard coach) right post interview. Image: Heidi Barbay 2008. Reproduced by kind permission of www.AnarchistAthlete.com

me, we can either sit back and we let someone else come up with it or we develop ourselves. Whether or not the sport agrees with it at the beginning [is questionable]. They probably will not disagree with it once they get a medal out of it. [They will probably be asking] what are these guys doing? Is this the right thing for the sport? If you put someone on the podium at the Olympic Games, I can guarantee you every man and his dog will be doing it after that. I agree with [using innovative training protocols], because as a coach in Australia, we can not rely on weight of numbers. We have to come up with alternate processes and techniques to train our athletes to get the results.

Jason Harding:

Exactly. It is basically the ideal the Australian Institute of Sport was built on. When you have a nation with low numbers of athletes, you have to do things in innovative ways to achieve success. Now if that makes you uncool in snowboarding, which seems to be the case, sometimes it is just something you have to take on the chin.

Ben Wordsworth:

Yeah, the Australian Institute of Sport did this in sport generally. They put together the Institute of Sport to do exactly what you just said and they started producing elite-level athletes with very little numbers [to start with] and a very small talent pool. It is only in the last 10 years or even in the last 4 years where the rest of the world cottoned onto this idea. Look at Britain, what they did. They took the AIS model, put four times as much money into it, and came out with medals. Way more medals than they should have. It will be the same with technology in winter sport too. Are you willing to put your [neck] out there and try some new things regardless of the perception [that may] come from the sport? [I suppose] it depends on how much you want to put into winning medals.

Jason Harding:

That's it Ben. Thanks heaps for your time.

Ben Wordsworth:

Cool mate.

3. CONCLUSION

It seems there is definite potential for automated objectivity to provide assistance to snowboard athletes and coaches striving to enhance athletic performance and to judges in their quest to accurately and reliably assess competition performance. It is, however, imperative that integration of any such technological innovation into the sporting discipline of half-pipe snowboarding be conducted alongside key practice community members in order to ensure that the sport retains what is currently valued: its capacity to provide a platform that allows competitive individuality and athletic freedom of expression.

4. MP3 AUDIO FILE OF INTERVIEW

The complete interview can be listened to at www.AnarchistAthlete.com

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Jason Harding is a fanatical surfer, skater and snowboarder. He is also a sport scientist (B.ExSc Hons) currently affiliated with the Australian Institute of Sport, the Olympic Winter Institute of Australia, and Griffith University's Centre for Wireless Monitoring and Applications. Jason is a Doctor of Philosophy candidate who has focused his research on enhancing the

competitive performance of Australia's elite-level snowboard athletes by undertaking: (i) a video-based analysis of the key performance variables associated with success in elite half-pipe snowboard competition; (ii) the subsequent development of an automated feedback system enabling the calculation of objective information associated with air time and the degree of rotation achieved during half-pipe snowboarding; and (iii) an assessment of the potential sociological impact of integrating automated objectivity into elite-level snowboarding. This research won first place in the Competitive Sports Category in the 2008 ispo-TUM (Technische Universität München) Academic Challenge Award (Germany). Jason uses his website www.AnarchistAthlete.com to publish innovative ideas and research outcomes associated with surf, skate and snow sports disciplines in addition to providing Australian coaches and athletes worldwide access to their personal testing results and the progression of their athletic performance.



Ben Wordsworth is a passionate snowboarder, elite-level coach and sports enthusiast. He is employed by the Olympic Winter Institute of Australia (OWIA) as the head snowboard coach, and is currently preparing the Australian national snowboard team for the 2010 Winter Olympic Games. Ben's role will be to conduct all athlete training and competition preparation and to oversee

the duties assigned to additional snowboard team coaching staff. In 2002, Ben was invited to develop a national snowboard program within the Olympic Winter Institute of Australia focused specifically on achieving top ten results at the 2006 Winter Olympic Games. Under Ben's guidance, the

program achieved this goal. Australian national snowboard athletes Torah Bright (half-pipe) and Damon Hayler (boardercross) finished in fourth and seventh place, respectively, at the 2006 Winter Olympic Games in Torino, Italy, thereby allowing the national snowboard program to firmly establish itself within the Olympic Winter Institute of Australia and focus on future directions. Ben is also currently undertaking a Master's degree in Business and Sports Management at Deakin University (Melbourne, VIC, Australia) as he continues to enhance his knowledge and practical experience in elite-level sport and coaching techniques.

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