

Using environmental constraints for improving skill acquisition.

By Tomasz Ondrusz

Within Snowsport England (SE) coaching scheme we tend to focus on developing skill which we understand as:

“The **learned ability** to bring about pre-determined **results** with maximum **certainty** and with minimum outlay of **time** or **effort** or both” (Barbara Knapp), in other words to do “what you **intend** with high repeatability and efficiency”.

The learners (whether beginners or elite performers) use feedback to modify their performance. Here feedback is a **specific** term meaning 'Information used by the performer during a skilful performance'. This includes prior beliefs, memories, knowledge, as well as sensory information to which the skier is attending. This information will be modified by the performer's perception and emotional state and will be used to automatically select their response.

As an example of the emotional response - one of the racers (whom I have had the pleasure to coach) decided to learn to ski after seeing Wallace and Gromit in Grand Day Out (<https://www.imdb.com/title/tt0104361/>) where a robot skis on the moon...

Let us consider a case of a group of beginner skiers who are just starting their skiing journey. Although they do not have ski-related learned abilities, they nevertheless approach skiing with individual beliefs, memories and knowledge.

Our novice skiers having spent some time exploring their new long feet somewhere on the flat are ready to start using gravity as the motive power. One approach (see Figure 1) to help them is for the instructor to assess the skier(s), slope, environment and run out (risk

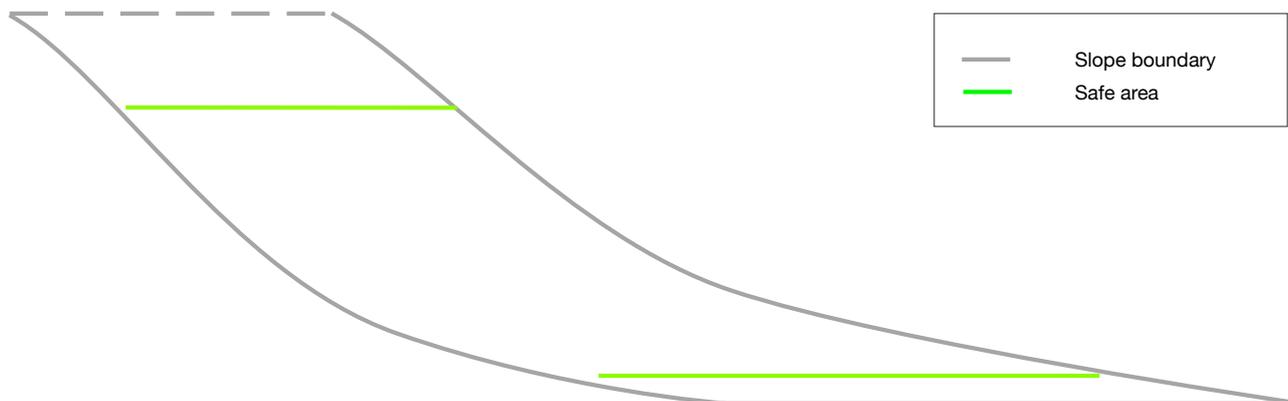


Figure 1. Typical 'first run' safe set up

assessment) before deciding how high the skiers should step up before shussing.

The Instructor carefully considers the sliding conditions, and decides that the activity is nominally safe. Instructors often give technical information about how to stand or verbal imagery ('goalkeeper position') and may even demonstrate what that should look like. Three skiers descend in a slightly wobbly manner without incident, and the next one feels that the skis are accelerating away decide to sit down/fall. This may (and likely will) affect their confidence for the next attempt possibly putting them off skiing.

The question for the instructor is why did this happen? Did they not hear the instructions? Are they unable to balance? Why did they panic? Will this happen again?

One of the (many) possible reasons that the failure occurred might be due to the 'stuff' inside of the skier - their knowledge, beliefs and memories. If they believe that skiing is dangerous or that they will travel very fast they may well take the initial cue of the feeling that the skis are 'running away' to cause them to panic and then fall. We can (as coaches) have some access to this information prior to the incident, but typically this requires an excellent rapport with the skier and we might not have sufficient time to develop this.

An alternate approach to the first few descents may (and in my experience does) produce much more predictable learning. The basic set up is shown in Figure 2.

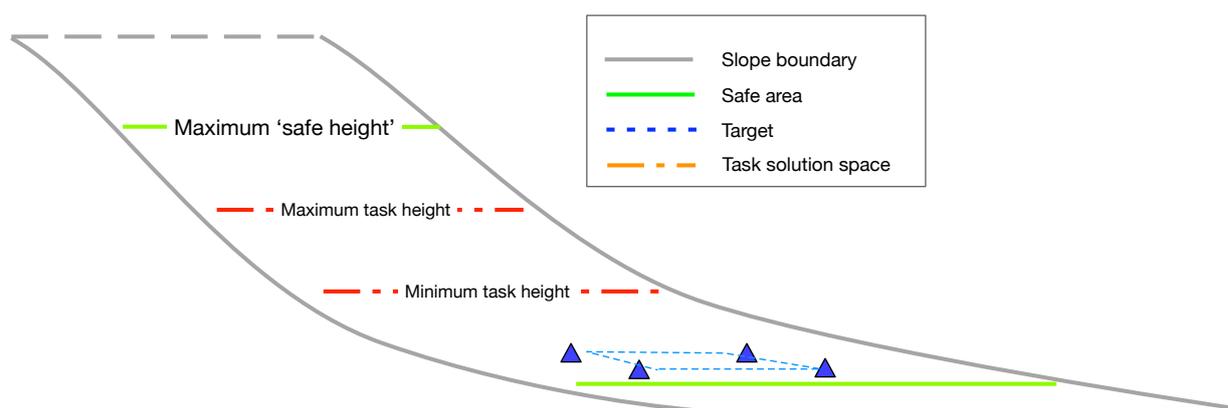


Figure 2. Target area 'first run' safe set up

The instructor does the risk assessment (as before) and decides the maximum height that will be safe as a starting point and mark it e.g. with a small cone. They then set up a small target in the run out area; the target can initially be rectangular. The instructor then asks the skiers to climb up the slope to wherever they think they need to (but below the maximum marker) with the task being to stop in the middle of the target area. The target area should be positioned such that a descent from around the maximum safe point would end up just beyond the target area

And this is where the 'magic' happens:

For skiers whose perception is that skiing is dangerous and that they will travel very fast will start very low - perhaps even too low to start sliding. This might be considered to be a waste of a run, however for this particular skier the feedback that they did not slide will compete with their belief that they will slide very fast. On the next attempt they will go a little higher, and gradually over a few attempts they will adjust their starting height, and crucially do all of the adjustments needed for balancing on the skis without explicit instructions about how to do it.

For skiers who are more 'athletic' they will likely start a bit higher up - possibly even at the maximum point. If they do, then they will slide beyond the target, and will gain valuable insight into how fast the skis slide.

When the instructor deems that the skiers need to travel a bit further, they can adjust the position of the target, and when they wish for the skiers to extend their 'movement

envelope' they would bring the target area nearer to the bottom of the slope (thereby reducing the difficulty of the underlying sliding task).

Likewise, if the skiers are finding the task easy to solve, then we can make the task require more accuracy by reducing the size of the target.

Using tasks such as these helps the skiers gauge the environment, makes the intended outcomes easy to judge for both the instructor and skier, and focuses the attention on 'where' rather than 'how'.

Once the skiers are able to do 'what they intend', the instructor can ask them to notice muscular tension while sliding, then (if excess tension is present) ask the skier to see if they can reduce the tension while still solving the task.

This relatively simple approach is quite powerful and subtle in that it requires the skiers to start making judgements and taking responsibility for their behaviour early on.

The collective name that we give this type of approach is: 'Task shaping behaviour', or more usefully:

'The perception of the task shapes the behaviour of the performer'

Let us now look at using this approach to shape performance at a higher performance level. For many of our skiers, the eventual aim is to be able to descend a slope in command and making rhythmical, symmetric linked arcs - e.g something like shown in figure 3:

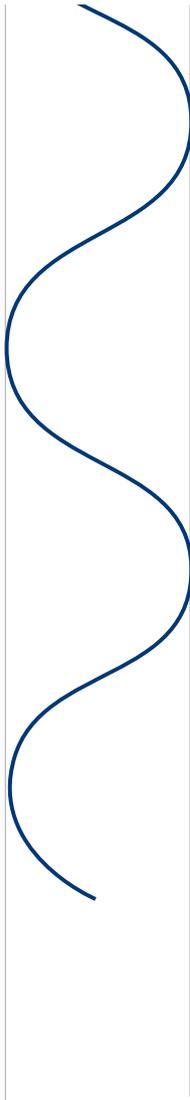


Figure 3. Idealised path of the skis

How could we come up with a series of tasks for a skier such that would end up with this type of behaviour? How soon can we start i.e. what is the minimum skill level necessary to start?

Well, once they can steer their skis in a straight line using a symmetrical gliding plough.

We can start by asking a skier to try to steer away from the straight line - first in one direction, then in the other. Once the skier can do this when they or us wish them - we can

usefully modify the task by giving the skiers some external targets. I have seen coaches using a marker 'mini slalom', however there is always a possibility of a skier losing control and fouling their ski on a marker, so I would like to propose a different approach. In this case all of the target markers will be outside of the path of the skier (so they will not be going around the markers) (Figure 4 a).

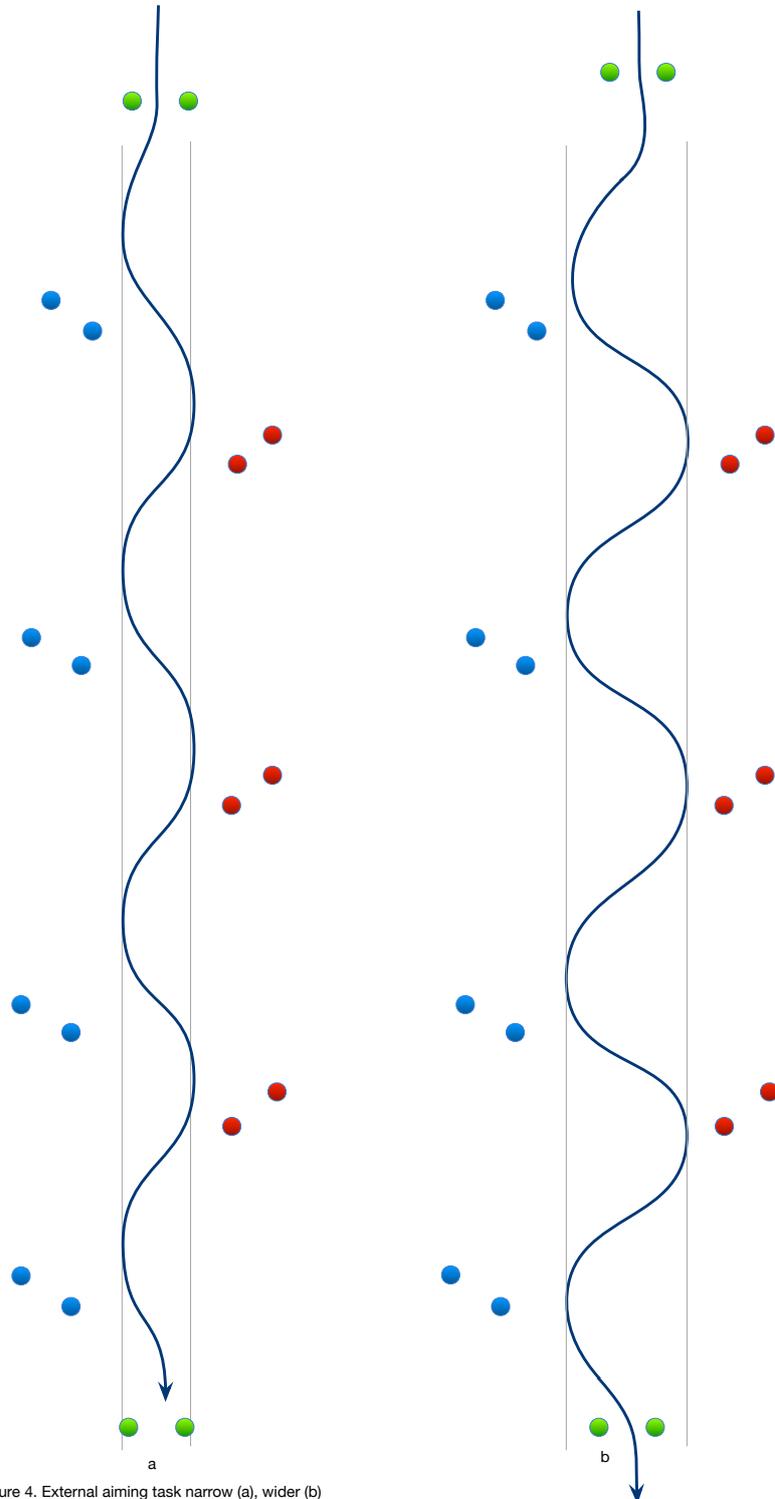


Figure 4. External aiming task narrow (a), wider (b)

We start the task with some markers that are external to the target width (amplitude). I tend to set markers in pairs (thereby requiring lower accuracy), and the task is described as:

1. Start the descent.
2. As soon as you have gone through the first pair of markers aim towards the centre of the blue markers
3. As soon as you are pointing toward the centre of the blue markers aim toward the next pair of red markers.
4. Repeat until the last pair of green markers

As soon as the skier has demonstrated the beginning of skill in solving this task (e.g. emergence of repeatability evidenced by 3 successful attempts), we would widen the target corridor by moving one side of markers wider (Figure 4b).

Once again there is a lot of subtlety in this approach - the skier always start facing down the slope, once skiers start solving the task well, we can ask them to solve the task faster or to use more of the the available width. We can adjust relative distances between pairs of markers so that the skier will have to work a bit harder when steering to the left or right, etc.

In conclusion the key takeaways from this article are:

- Skill development includes repeatability
- Using tasks help the performers look outside of themselves, noticing the outcome of their behaviour and make adjustments during their performance. This gives them valuable, additional feedback
- Tasks shape behaviours



Please tune into the Locked in Shed podcast – episode 7 (and the rest of the series!) for more context on the relationship between skill development and tasks www.anchor.fm/lockedinshed
For visuals, search for Locked in Shed on Instagram <https://www.instagram.com/lockedinshed/>
Enjoy the reading and listening, then please write to us at lockedinshedpodcast@outlook.com to tell us what you'd like to hear about in future episodes.

Tomasz Ondrusz is a senior tutor for SSE and has been involved with performance skiing since mid 1980s first as a competitor (poorly) then as coach (more successfully).