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Re-representation underlies Acquisition of Embodied Expertise: A Case Study of Snowboarding

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Verbalization of Re-representation Underlies Acquisition of Embodied Expertise

What kind of cognitive processes underlie acquisition of embodied expertise? The present paper addresses this issue through a case study of acquiring skills in snowboarding. Ecological Psychology views expertise as differentiation: perceptual learning consists of responding to variables of physical stimulation not previously responded to (Gibson and Gibson, 1955). Furthering this view, we are to claim an expertise-as-re-representation view. Not just differentiating features and relations in the environment that were not evident before, but also re-representing the relationships between one's own body and the environment underlie the process of acquiring embodied expertise. What is meant by "re-representation" is not just a state in which the body has "known" new relations against the environment. Importantly, we claim that conscious awareness, and thus meta-cognitive verbalization, of re-representing relationships between the body and the environment is a crucial component of the process of acquiring embodied expertise (Suwa, 2004).

A Case Study in Snowboarding

To examine the feasibility of our view, we conducted a study in which a male university student, who has snowboarded for a year and thus is a novice, participated in a habit of verbalizing for 4 months what his body perceived or should perceive as he snowboarded, and how he moved or should move his body. He verbalized by writing down his thoughts, immediately after snowboarding and on off-snowboarding situations between trips. He snowboarded for 10 days during the 4 months. Every time he videotaped his performance of "jump on a bump" and "body-flip on a side wall of a half pipe". The number of dates of verbalization during the 4 months amounted to 25 times.

Table 1: Change over time of performance score

Dates of verbal.	1 - 4	14 - 17	19 - 22
Average score	5.6	8.4	9.5

To examine the improvement of his skill, one expert skier with about 30 years of experience watched the videotapes and evaluated every jump and body-flip for each trip. He scored on a 5-point scale from three perspectives, i.e. speed, balance and height, so the full mark for one jump or body-flip is 15 point. 10 snowboarding trips divided into three periods, Dates 1 through 4, 14 through 17, and 19 through

22. Table 1 shows the average score of all jumps and body-flips for each period. That well indicates the improvement of his performance.

We coded the contents of verbalization into five categories; body movement, board, snow surface, mental states, and performance. Figure 1 shows the changes of the amount of verbalization for the three major categories, body, board and snow surface. Important is that frequent co-occurrence of the three categories on and around Date20 coincided with the improvement toward the third period. Further, two peaks of the amount of verbalization describing a relation among more than three categories shown in Figure 2 coincided with the improvement around the second and third periods. Assuming that conscious awareness of more-than-triple relations rather than binary ones is a revelation of drastic re-representation, these findings are supportive to our expertise-as-re-representation view.

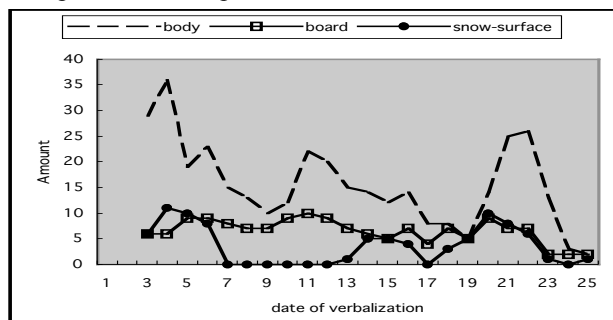


Figure 1: Changes of the amount of verbalized contents

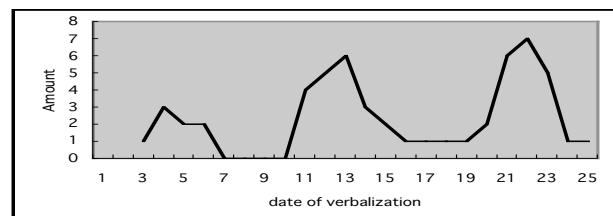


Figure 2: Changes of the amount of verbalization describing a relation among more than three categories

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