Table I. Edging angles in straight descent.

Locus of the center of gravity	Direction of locus	Edging angle	Direction of ski
(1) Fig. 7. $Y>70$ cm	$\theta=$const. $\neq 0$	$\beta_0=0$	$\delta \neq$ const.
(2) Fig. 8. $Y>40$ cm	$\theta=$const. $\neq 0$	$\beta_0=0$	$\theta \neq \delta=$const.
(3) Fig. 10. $Y>60$ cm	$\theta=$const. $=0$	$\beta_0=0$	$\delta=0$
(4) Fig. 11. $Y>60$ cm	$\theta=$const. $\neq 0$	$\beta_0=0$	$\theta=\delta=$const.

downhill run resulted. In condition (4), since $\theta=\delta=$constant $\neq 0$, traversal was produced. Therefore, regardless of the type of skiing, if the motion is a straight descent such as a straight downhill run and traversal, whether accompanied by rotation about the center of gravity or sideslipping, β_0 is always zero. Therefore, *the $\beta_0=0$ condition is important in producing straight descent.*

Generally speaking, the straight downhill run ($\delta=\theta=0$) and traversal ($\delta=\theta=$constant $\neq 0$) are considered to be different phenomena. However, in terms of edging angle β_0, both require the condition $\beta_0=0$, and are considered to be the same procedure. Kinosita states that traversing takes place when the direction of the ski-width cross section is horizontal.[3] Condition (4) in Table I satisfies this state. Moreover, when conditions (1) through (3) are included, the conditions for straight descent can be produced when the cross section, which is perpendicular to the direction of motion (generally different from the direction of the ski), is horizontal.

4.2 *Turning descent*

Let us examine the relationship between turning and edging angle β_0. As shown in Figs. 7, 9, 10 and 12, the inflection point of the locus is at $\beta_0=0$. When $\beta_0>0$, a right turn is produced; when $\beta_0<0$, a left turn results. In this way, there is a relationship between the sign of β_0 and the turning direction. From this, it is understood that *the requisite condition for turning descent is $\beta_0 \neq 0$.*

In the previous paper,[1] we identified one of the factors involved in initiating a turning descent from a straight downhill run: the application of an edging angle. As described, the conditions are $\theta=0$ and $\beta_0=\beta$; thus the results of the previous paper are in agreement with those of the current investigation. Hence, it is justified that edging angle β described in the previous paper is the same as β_0.

4.3 *Sand skiing and snow skiing*

The relationship between the sign of edging angle β_0 and the turning direction on sand is the same as that on snow, as shown in Fig. 14. Therefore, this experiment shows that, essentially, there is no difference in the mechanism between a turn on sand and one on snow.

4.4 *Accuracy of measurements*

Although the center of gravity of the ski was fixed, the curvature of the locus in each experiment was different. This was due to the progressive of packing of the sand as the number of experimental runs increased. Nonetheless, the relationship between the sign of edging angle β_0 and the direction of turn did not change.

References

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