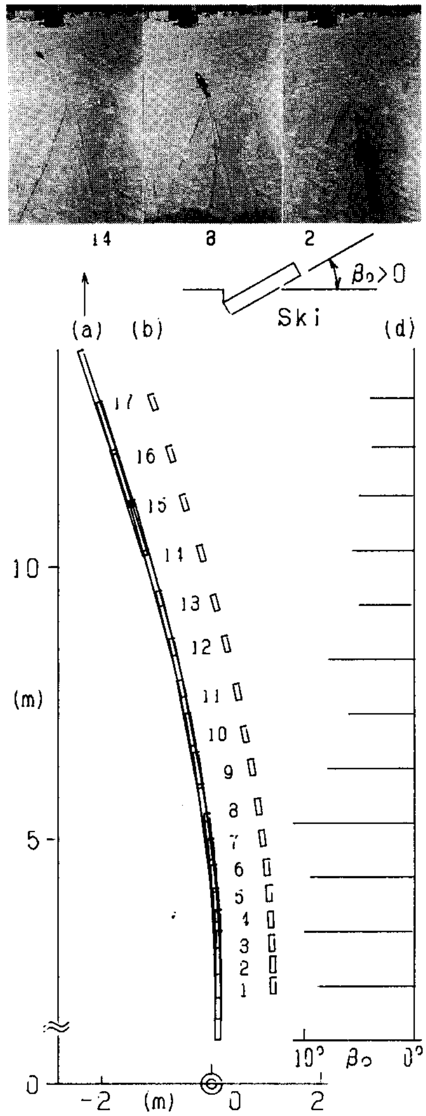

Fig. 9. Locus of an iron-plate ski and β_0.

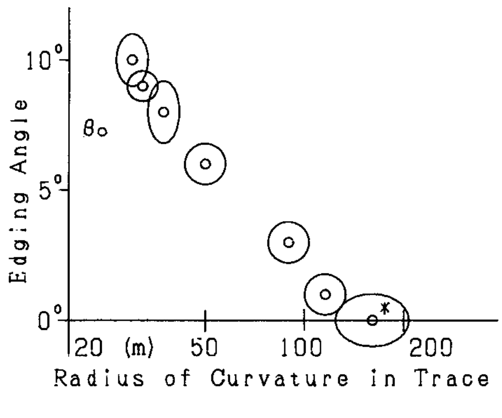

Fig. 10. Radius of curvature of the iron-plate ski and β_0. The large circles represent the error range.

experiments using a model ski[2] and an iron-plate ski, are summarized as follows: *In one-legged skiing,* $\beta_0 = 0°$ *in a straight descent, and* $\beta_0 \neq 0°$ *in a turning descent. In two-legged skiing,* $\beta_{0s} = 0°$ *in a straight descent, and* $\beta_{0s} \neq 0°$ *in a turning descent.*

3.2 *Muscular strength and ski turn*

(1) Skiers who has experienced a parallel turn seem to feel that it is his twist of body and muscular strength

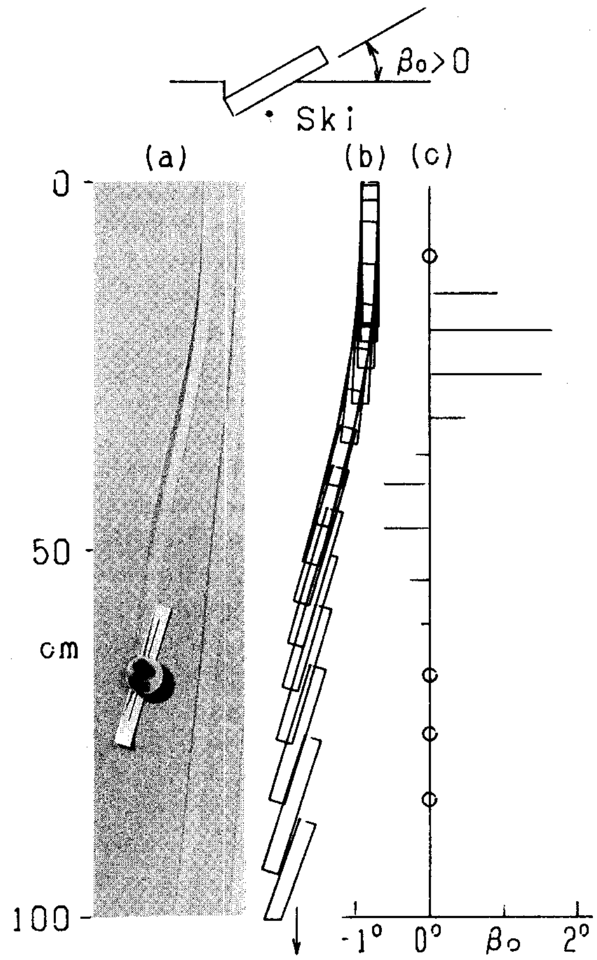

Fig. 11. Locus of a model ski on a sand plane and β_0.

that makes the skis turn.[4,5] Skiers think that their *muscular strength used to make a turn* is a cause of the turn, and *turning descent of skis* occurs as an effect of muscular strength. (2) According to the results of our experiments, the β_0-rule holds whether or not a skier is on the skis. The results of these experiments indicate that the skier's *muscular strength to make a turn* is not the cause of the turn. There is a discrepancy between (1) and (2). Therefore, let us conduct the following experiment.

3.3 *Car passenger's sense of turning*

Assume that you are sitting in a car next to the driver, with your legs extended and feet placed on the floor, and with separation between your knees and the seat. Let us examine how your knees will move if the car makes a left turn. Your knees are in front of your body while the car is traveling straight ahead. When the car begins to make a left turn, your knees move downward and to the right due to centrifugal force. Therefore, when the car is turning left, you will make your knees twist to the left, using your feet for support, so that your knees do not move downward and to the right. You will feel that *the twist of your knees (i.e., muscular strength used to make the twist) made the car turn left* even though your knees were apparently stable. Both cars and skis are types of vehicles. Let us now change the vehicle under consideration from a car to a ski.

3.4 *Problems related to skier's perception*

Let us assume that the *turning descent of a ski* occurs to the left, as determined by the edging angle β_0. At the occurrence of the turn, the skier executes a *twist of the body* to the left, using his feet as supporting points, so that he will not fall down. Here, the *turning descent of the ski* determined by β_0 is the cause of the turn, and the *twist of the body* is the effect. (In terms of time, *turning descent of the ski* and *twist of the body* occur simultaneously. If not, the skier will fall down.) However, the skier will feel that the *twist of the body (i.e., muscular strength used to make the twist) made the ski turn left.* That is to say, the skier feels that the *twist of the body* is the cause of the turn, and as an effect, *turning descent of the ski* occurs. Let us assume the opposite cause-effect relationship to the one felt by the skier. Here, *turning descent of the ski* determined by β_0 is the cause, and *twist of the body* is the effect. This assumption shows no discrepancy with our results obtained in experiments using skis or a car. When we use a model ski or an iron-plate ski, the ski does not tip over without *twist of the body,* because the center of gravity is low. When a skier ski is used, the skier will fall down without *twist of the body* since the center of gravity is high. The *skier's sense of making a ski turn* described in the introduction might be *a problem related to the perception of the skier, who mistakes cause for effect.*

Practice of ski turns should therefore consist of drills in simultaneously effecting *creation of angle* β_0 and *twist of the body.*

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