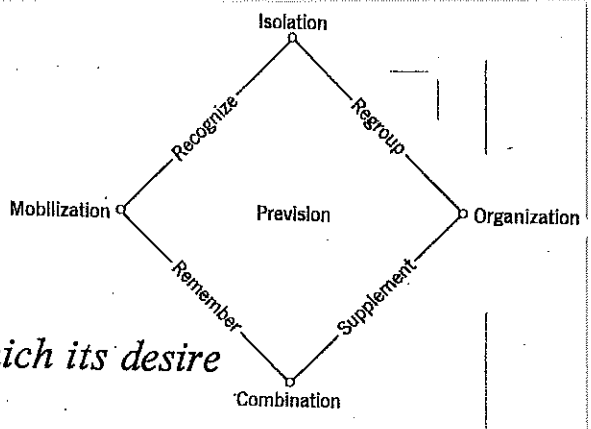
THE COMING OF THE IDEA



My mind was struck by a flash of lightning in which its desire was fulfilled.

DANTE: *Paradiso,* Canto XXXIII.

10.1. Seeing the light

The solution of a problem may occur to us quite abruptly. After brooding over the problem for a long time without apparent progress, we suddenly conceive a bright idea, we see daylight, we have a flash of inspiration. It is like going into an unfamiliar hotel room late at night without knowing even where to switch on the light. You stumble around in a dark room, perceive confused black masses, feel one or the other piece of furniture as you are groping for the switch. Then, having found it, you turn on the light and everything becomes clear. The confused masses become distinct, take familiar shapes, and appear well arranged, well adapted to their obvious purpose.

Such may be the experience of solving a problem; a sudden clarification that brings light, order, connection, and purpose to details which before appeared obscure, confused, scattered, and elusive.

In these matters, however, one grain of experience is worth more than pounds of description. To come closer to personal experience we should get down to a concrete example. Very elementary mathematical examples may be the best to bring us the work, the suspense, and the pleasure of discovery and to "accustom our eyes to see the truth clearly and distinctly." (The last phrase is borrowed from Descartes.)

1. Solving a problem means finding a way out of a difficulty, a way around an obstacle, attaining an aim which was not immediately attainable. Solving problems is the specific achievement of intelligence, and intelligence is the specific gift of mankind: solving problems can be regarded as the most characteristically human activity. The aim of this work is to understand this activity, to propose means to teach it, and, eventually, to improve the problem-solving ability of the reader.

Mariotte says that the human mind is like a bag: when you are thinking you are shaking the bag until something falls out of it. Hence there is no doubt that the result of thinking depends to some extent on chance. I would add that the human mind is more like a sieve: when you are thinking you are shaking the sieve until some minute things pass it. When they pass, the spying attention catches whatever seems relevant. Again, it is something like this: to catch a thief, the commander of a city orders the whole population to pass a certain gate where the man who was robbed is watching. Yet, to save time and trouble, some method of exclusion may be used. If the man robbed says that the thief was a man, not a woman, and an adult, not a youngster or a child, those not concerned are excused from passing the gate.

LEIBNITZ: *Opuscules et fragments,* p. 170.

11.1. How we think

A problem solver must know his mind and an athlete must know his body in about the same way as a jockey knows his horses. I imagine that a jockey studies horses not for the sake of pure science but to make them perform better, and that he studies more the habits and whims of individual horses than horse physiology or horse psychology in general.

What you start reading now is not a chapter in a textbook of psychology; it is not exactly a conversation between problem solvers who talk about the habits of their minds as jockeys may talk about the habits of their horses; it is, however, more like a conversation than a formal presentation.