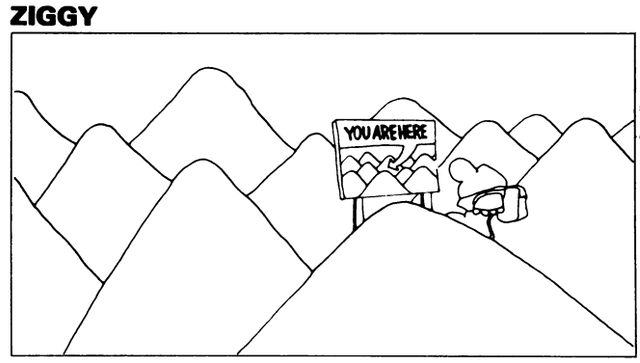
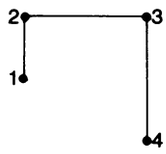
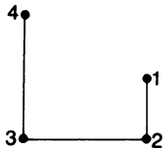
Getting From Here To There



By WRAY HERBERT



Here is a simple psychological experiment to run on a volunteer research subject. Allow the subject to study this rudimentary map for 20 seconds: Now instruct him to close his eyes and say to him: "You are standing at point 3 and point 4 is directly behind you; walk directly to point 1." Time your subject's deliberation, and note the direction he chooses to walk.



Now repeat the task, showing your subject this map: Say: "You are standing at point 3 and point 4 is directly behind you; walk directly to point 1."

If your subject is typical of subjects in a recent experiment, he will tend to do much better on the first task than on the second. Why? According to Marvin Levine, a psychologist at the State University of New York at Stony Brook, these research subjects are being asked to do (in simple form) what they are required to do every day—to use "cognitive maps" to figure out shortcuts through their environment. Some cognitive maps, Levine says, are much more useful than others.

Levine has tested research subjects on a variety of tasks like these, and he has come up with what he considers a surprisingly dramatic result. On tasks like the first one above, subjects almost always ended up at or near point 1; and they did not have to think too long to come up with the proper shortcut. On tasks like the second, in contrast, subjects took considerably longer to make a choice and walked in the opposite direction nearly one out of every three times. When they did not walk in the opposite direction, they seemed to make random choices about where to head.

In the two experimental tasks described above, Levine points out, the maps were both accurate; what differed was that only the first was properly aligned with the actual terrain through which the subject had to maneuver; the second was rotated 180°. The experimental results, he says, indicate two things: that people assume maps to be properly aligned with the terrain they are facing; and that the cognitive maps they construct are much easier to use when they are indeed aligned with the terrain.

These experimental tasks are part of a larger research project that Levine has been conducting on the construction and use of cognitive maps — on how people draw on information from their environment to navigate the everyday world. From these experiments Levine has drawn some basic principles of human navigation that explain the ease and difficulty of the tasks above — and principles, he says, that are commonly ignored in the design of the modern world.

The basic question underlying Levine's research is: when people learn to get around in a new terrain, what precisely have they stored in their brain? Have they stored a verbal description of the proper route, for example, or have they created and stored pictures, or maps. The answer, Levine suggests, is probably both, depending on the demands of the space and one's needs. Levine found in another experiment that when subjects learned a simple route — through a maze, for example — they often stored a verbal record: two right turns, a left, two rights. When one is in a maze (or making a rare visit in an unfamiliar part of town), there may be no need to picture the whole terrain in order to negotiate it.

It used to be thought that route learning —through mental association—could explain all human navigation. But people do not move at prescribed right angles through a shopping mall or airport, for example; they take shortcuts, and route learning cannot explain shortcuts. Shortcuts, Levine says, require a more sophisticated sense of the environment—one that is stored in the form of a map. And there seem to be some clear psychological principles governing map use.

In addition to terrain alignment, Levine says, people who view a vertical map assume that *up* is the psychological equivalent of forward, so that an upside-down cognitive map must be mentally spun around to be used (just as a driver might spin his road map, putting north at the bottom). Some subjects showed that they were able to do this on the simple laboratory task. But as environments and their corresponding maps get more and more complex, Levine predicted, it would become increasingly difficult to perform the mental gymnastics necessary to get properly oriented. Levine designed a typical "you-are-here" map, which he placed on the wall of a fairly elaborate office building. For half the subjects the map was properly aligned, with *up* corresponding to what lay in front of the subject; for the other half, the map was upside-down. The subjects with a properly aligned map used much less time and were much more likely to make their way successfully to a designated goal.

What surprised Levine was just how difficult it was for subjects to use a misaligned map. In a third, similar experiment, Levine first taught his subjects what it meant for a map to be properly aligned and how to mentally adjust to a misaligned map: still, 49 of 88 subjects using misaligned maps failed, compared with 2 of 88 with aligned maps.

The problem with trying to use a misaligned map is two-fold, Levine says. First, people do not seem to know intuitively to flip the map over; some seem to know that they have to make some mental adjustment, but they do not know just what (some subjects did a physical about-face in an attempt to get oriented). And even the better problem solvers, those who figure out that their cognitive map must be spun, have great difficulty doing it; it is very difficult, Levine says, for the typical subject to keep in mind his starting place and his goal while at the same time mentally reorienting himself. An improperly oriented map, Levine concludes, is worse than useless.

While these principles may seem to appeal to common sense once they are known, Levine says, they are commonly ignored by those who are responsible for guiding us through the modern world. While carrying out his experimental work on you-are-here maps, Levine began paying attention to the you-are-here maps actually in use. His impression was that their placement was haphazard, so he decided to gather data on how such maps are aligned. Based on a study of 19 maps — in shopping malls, office buildings, universities and hospitals — he found that the typical you-are-here map was 90° out of alignment. Only three of the 19 maps were properly aligned, and three were contra-aligned 180°. One of the latter—a hospital, Levine notes — discovered the misalignment only after dental patients began showing up repeatedly in the obstetrics ward, while pregnant women were appearing in the dental clinic. In short, Levine concludes, there is little evidence that the psychological dimensions of map making and map use are well understood. □