

(G) Manam, I'm Anam

G1. Onkau's, Mombwa's, and Kulu's houses have already been located on the map. Who lives in the other five houses?

A: *Pita*

B: *Butokang*

C: *Sulung*

D: *Tola*

E: *Sala*

G2. Arongo is building a house in the location marked with an X. In three Manam Pile sentences, describe this location in relation to the three closest houses.

1. *Arongo pera kana ilau ieno, Butokang pera kana auta ieno.*
2. *Arongo pera kana ata ieno, Pita pera kana awa ieno.*
3. *Arongo pera kana awa ilau ieno, Sulung pera kana ata auta ieno.*

G3. Explain your answers.

The analysis of the given examples suggests that *auta*, *ilau*, *ata*, and *awa* are the significant words, which probably represent directions. For reference, “*X pera kana*” means “*X's house*”, and *ieno* means “is located.”

We can see that *auta* and *ilau* appear to be opposed, and that *ata* and *awa* are also opposed. We thus hypothesize that they represent two axes of dimensions, and we support this hypothesis by observing that their compounds are intermediate directions, such as *awa ilau* vs. *ata auta*, and *awa auta* vs. *ata ilau*. In fact, these compounds may occur in either order; for example, *ilau awa* and *auta ata* are also directions. *Ilau awa* is similar but not identical to *awa ilau*, in the same way as “north-north-west” is similar but not identical to “west-north-west.”

When we analyze the relative locations of the houses of Onkau, Kulu, and Mombwa, we may be tempted to assume that *auta* is North, *ilau* is South, *awa* is East, and *ata* is West. This assumption works until about halfway through the problem, but then we should notice contradictions: either these directions are very imprecise or some houses are in the sea.

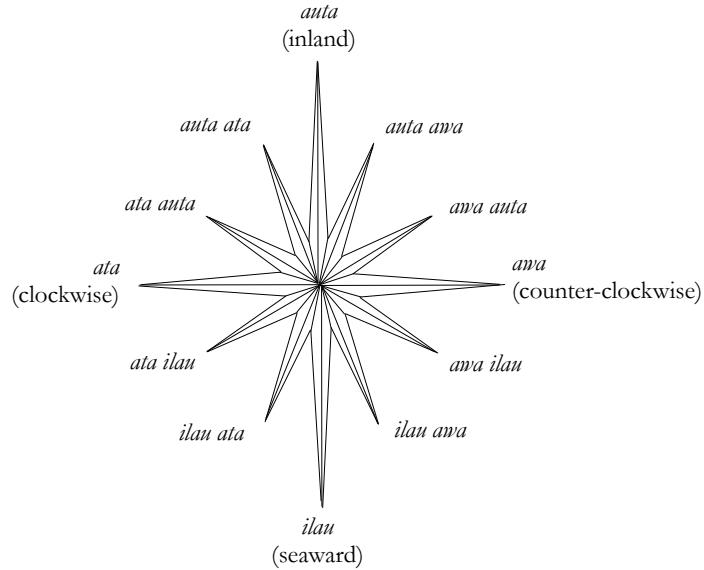
When we reach a contradiction, we should try discarding some of the underlying assumptions; in this case, we discard the assumption that the islanders reckon the traditional directions, that is, North, South, East, and West. Instead, we should consider other directional possibilities that may occur to the islanders.

In fact, *auta* means “inland” or “upland,” which is the same thing on a cone-shaped volcanic island, and *ilau* means “seaward.” Furthermore, *Ata* means “clockwise around the island,” and *awa* means “counterclockwise”. The compound direction *awa auta* thus means “inland in a counterclockwise direction”.

An alternative approach to solving this problem is as follows. We may be fairly certain that the directions form two axes, *auta/ilau* and *ata/awa*. Instead of placing islanders on the given map, as soon as we have a hunch where they live, we can work out an abstract two-dimensional map indicating the relative locations of the houses. Then, by comparing it to the given map, we can see that the only way to reconcile the

two maps is to “wrap” the abstract map around the island, that is, to curve the Cartesian grid of houses into a polar grid centered on the volcano.

The full Manam compass rose is as follows:



Note that some of the directions are irrelevant to the problem, and we have included them only for completeness. Also note that the angle between *auta* and North depends on a specific location, which means that this compass would rotate with respect to the traditional North/South compass as we walk around the island.

If you have solved this difficult problem, you are probably able to examine and revise your initial assumptions, which is an essential research skill.