

## Smullyan's Revenge: The Smullyaning III<sup>1</sup>

Smullyan once dreamed that there was a certain island called the Isle of Dreams. The inhabitants of this island dream vividly; indeed, their thoughts while asleep are as vivid as while awake. Moreover, their dream life has the same continuity from night to night as their waking life has from day to day.

As a result, some of the inhabitants sometimes have great difficulty knowing whether they are awake or asleep at a given time.

- Each inhabitant is one of two types: diurnal and nocturnal.
  - A diurnal inhabitant is characterized by the fact that everything he believes while he is awake is true, and everything he believes while he is asleep is false.
  - A nocturnal inhabitant is the opposite. Everything a nocturnal person believes while asleep is true, and everything he believes while awake is false.
1. At one particular time, one of the inhabitants believed that he was of the diurnal type. Can it be determined whether his belief was correct? Can it be determined whether he was awake or asleep at the time?
  2. On another occasion, one of the natives believed he was asleep at the time. Can it be determined whether his belief was correct? Can it be determined what type he is?
  3. a. Is it true that an inhabitant's opinion of whether he is diurnal or nocturnal never changes? b. Is it true that an inhabitant's opinion of whether he is awake or asleep at the time never changes?
  4. At one time, an inhabitant believed that she was either asleep or of the nocturnal type, or both (Or means *at least one or possibly both*). Can it be determined whether she was awake or asleep at the time? Can it be determined what type she is?
  5. At one time, an inhabitant believed that he was both asleep and diurnal. What was he really?
  6. There is a married couple on this island whose last name is Kulp. At one point Mr. Kulp believed that he and his wife were both nocturnal. At the same time, Mrs. Kulp believed that they were not both nocturnal. As it happened, one of them was awake and one of them was asleep at the time. Which one of them was awake?
  7. There is another married couple on this isle whose last name is Byron. One of them is nocturnal and the other is diurnal. At one point the wife believed that they were either both asleep or both awake. At the same instant, her husband believed that they were neither both asleep nor both awake. Which one was right?
  8. Here is a particularly interesting case: at one time an inhabitant named Edward believed amazingly that he and his sister Elaine were both nocturnal, and at the same time that he was not nocturnal. How is this possible? Is he nocturnal or diurnal? What about his sister? Was he awake or asleep at the time?

---

<sup>1</sup> These problems have been adapted from Smullyan's *The Lady and the Tiger*, which possesses more interesting logic puzzles like these than I could conceivably borrow.