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If you don't find anything, is there really nothing there?

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From the text: Let us suppose that you are looking for some objects in a particular area. Now also suppose that you find nothing after searching the area. Is there really nothing there? Or, more generally, if you find N objects, then how many objects are there left to be found? Equivalently, how many were actually there to be found in the first place? The objects might be physical objects such as people in a search and rescue operation, or animals, schools of fish, ore pockets or oil deposits. Or they might be "virtual" things like bugs in computer code, faults in manufactured products, etc. If the sensors you use, whether some electronic means or even your own eyes, are perfectly capable and will find an object with 100 % probability, then the answer is clearly trivial. You have found all that were there to be found. But what happens if your sensors are less than perfect, either inherently so, or perhaps because the objects may be concealed or the environment difficult to search? Moreover, if you know before the search that there are M objects there and you find N, then you also know that there are $M-N$ left after the search. But what if the number of present objects is uncertain and can be expressed as a probability distribution on the number of objects thought to be present. Intuitively, if we find N of these, then there should be a resultant distribution of the number of objects left. We will see how these two distributions can be connected, together with the probability of finding each object, through what is known as Bayes' Theorem.

Classification: K60 K70
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