Discussion Board 4.1 – Bohm-Jacopini Theorem

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This week we look at the Bohm-Jacopini Theorem, also known as the “structured program theorem” (Wikipedia, 2022). I do not regularly use Wikipedia and do not condone its use in research. However, of all the pages I searched, I found the clearest description of the theorem in the first paragraph of the page. This theorem was written by Corrado Bohm and Giuseppe Jacopini in 1966. The theorem suggests that “only 3 rules of grammar are needed to combine any set of basic instructions into more complex ones” (Rapaport, 2004) :

- **Sequence:** Do this; then do that
- **Selection** (or **choice**): IF such-&-such is true,
  THEN do this
  ELSE do that
- **Repetition** (or **looping**): WHILE such-&-such is true
  DO this

As a pretty simple guy, I enjoy pretty simple things. I very much enjoy when things are broken down into basic components, lists, and tasks (I am after all, an INTJ). This might explain my love of cooking and using or creating recipes. This theorem is great because I can see that most things can be broken down as it suggests.

Take cooking, for example. The sequence is the ingredients: add flour, add baking powder, add milk, add butter, then mix. The selection is a basic If-Then-Else statement: if (If) the batter is still lumpy, (Then) mix it longer. Otherwise (Else), pour it in a dish. The third component is repetition. It uses a basic While loop, but a Do-While loop might work, also. And by stating While = True, this implicitly allows for While != True, or False. For instance, While the dish is in the oven (True), do the dishes. Or, While the toothpick is not clean (False) when it is pulled out of the center of the product in the dish, (Do) wait longer then try again until the toothpick comes out clean (True). Then move on to a new sequence.

While I find this theorem can be used to describe hundreds of activities, like driving or programming, there are those who have disproved the theorem. They may have valid points and will need further investigation and reading. However, sticking to my simple perspective, I rather enjoy this theorem and can see myself already applying it to my everyday mundane tasks.

References

Rapaport, W., 2004. *"Great Idea III: The Boehm-Jacopini Theorem and Structured Programming."* Course CSE 111, University at Buffalo – University of New York. https://cse.buffalo.edu/~rapaport/111F04/greatidea3.html

Wikipedia, 2022. *"Structured Program Theorem."* Wikipedia.com, Oct 16, 2022. https://en.wikipedia.org/wiki/Structured_program_theorem