

1 a) My model of Φ is as follows:

B_1
B_2
B_3

In this scenario, in English, we would describe B_2 as under B_1 , B_3 as under B_2 , and B_3 as under B_1 . In other words, the English description of under is transitive.

However, this model and the predicate symbol $\text{under}(y, x)$ do not satisfy the English def'n:

$$\text{Under}(B_3, B_1) \leftrightarrow (B_1 \text{ is immediately above } B_3) \vee (B_1 \text{ is not above any blocks} \wedge B_1 = B_3)$$

B_1 is obviously above B_2 and B_3 by definition and is not equal to B_3 obviously. We can also see B_2 is immediately above B_3 , so B_1 is obviously not. We can substitute false for these statements:

$$\text{Under}(B_3, B_1) \leftrightarrow (\text{false}) \vee (\text{false} \wedge \text{false})$$

$$\text{Under}(B_3, B_1) \leftrightarrow \text{false}$$

Therefore by definition B_3 is not under B_1 , which conflicts with the English definition.