A Subtle Point

The formula

$$\land\ \forall\, i \in \text{DOMAIN}\ A\ :\ \ A'[i]\ =\ (\ \text{IF}\ i = 3\ \ \text{THEN}\ 42\ \ \text{ELSE}\ A[i]\ )$$

$$\land\ (\text{DOMAIN}\ A') = (\text{DOMAIN}\ A)$$

does not imply that A' is a function. If v is not a function, then the values of DOMAIN v and $v[x]$ for some number x are not specified. The semantics of TLA$^+$ does not rule out the possibility that this formula is satisfied if A' equals $\sqrt{43}$. (The semantics also does not say whether or not $\sqrt{43}$ is a function.)

To turn this formula into a correct specification of the assignment statement, we have to add the requirement that A' is a function. This requirement is expressed by the formula

$$A' = [i \in \text{DOMAIN}\ A' \mapsto A'[i]]$$

Can you see why?

CLOSE