Other Notations for EXCEPT

No one likes this notation. However, I have found no alternative that I like better. Mathematics provides no helpful notation for writing the function that is the same as a function f except that $f[x]$ equals e. The notation $[f \text{ EXCEPT } ![x] = e]$ is reasonably self-explanatory if you realize that the "!" stands for the f, so you can think of it as $[f \text{ EXCEPT } f[x] = e]$.

The EXCEPT notation is more general than indicated by this example. The value of A after executing $A[i][j] := e$ is

$$[A \text{ EXCEPT } ![i][j] = e]$$

Records (also known as *structs* in C) are represented in TLA$^+$ as functions, and the value of record R after executing $R.d := e$ is

$$[R \text{ EXCEPT } !.d = e]$$

These notations can be combined, as in

$$[B \text{ EXCEPT } ![i].d[j] = e]$$

Any sensible notation for expressing all these functions will be some syntactic variant of the EXCEPT notation. One can devise a more compact notation by replacing the "EXCEPT" with some punctuation, but I think that would make it even more obscure.

CLOSE