Another look at the elsif grammar

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Here is a more methodical and maybe mathematical approach.

Let subscript \( m \) denote matched and \( u \) unmatched. Then let’s make a shorthand for the longer productions involved in if statements and elsif. What I want to do is list all the syntactically legal statements involving if and elsif using this notation. So let’s use this shorthand:

- \( I_m \rightarrow \text{IF test THEN matched} \)
- \( I_u \rightarrow \text{IF test THEN unmatched} \)
- \( Z_m \rightarrow \text{ELSIF test THEN matched} \)
- \( Z_u \rightarrow \text{ELSIF test THEN unmatched} \)
- \( E_m \rightarrow \text{ELSE test THEN matched} \)
- \( E_u \rightarrow \text{ELSE test THEN unmatched} \)

Using something like a regular expression here are the Legal statements using an elsif divided into two catagories: matched and unmatched:

matched:
\[ IZ^*_m E_m \]

unmatched:
\[ IZ^*_m \]
\[ IZ^*_m Z_u \]
\[ IZ^*_m E_u \]

And in fact if you included matched and unmatched versions of the IF ( \( I_m \) and \( I_u \) ) then you get these legal statements:

matched:
1. \( I_m Z^*_m E_m \)

unmatched:
2. \( I_u \)
3. \( I_m Z^*_m \)
4. $I_m Z'_m Z_u$

5. $I_m Z'_m E_u$

That’s it. Only these are legal.

Now each of the 5 patterns above is composed of roughly three parts: the if part, the loop on elsif part, and the part that terminates the loop of elsifs.

$\text{matched} \rightarrow I_m \text{matchedElsif}$

$\text{matchedElsif} \rightarrow Z_m \text{matchedElsif}$

$| \quad E_m$

$\text{unmatched} \rightarrow I_u$

$| \quad I_m$

$| \quad I'_m \text{unmatchedElsif}$

$\text{unmatchedElsif} \rightarrow Z_m \text{unmatchedElsif}$

$| \quad Z_m$

$| \quad Z_u$

$| \quad E_u$