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:

- $I_m \rightarrow$ **IF** *test* **THEN** *matched*
- $I_u \rightarrow$ **IF** *test* **THEN** *unmatched*
- $Z_m \rightarrow$ **ELSIF** *test* **THEN** *matched*
- $Z_u \rightarrow$ **ELSIF** *test* **THEN** *unmatched*
- $E_m \rightarrow$ **ELSE** *test* **THEN** *matched*
- $E_u \rightarrow$ **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. $I_mZ_m^*E_m$

unmatched:

2. I_u
3. $I_mZ_m^*$

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.

$$
\begin{aligned}
\textit{matched} &\rightarrow\ I_m\ \textit{matchedElsif} \\
\textit{matchedElsif} &\rightarrow\ Z_m\ \textit{matchedElsif} \\
&\mid\ E_m \\
\textit{unmatched} &\rightarrow\ I_u \\
&\mid\ I_m \\
&\mid\ I_m\ \textit{unmatchedElsif} \\
\textit{unmatchedElsif} &\rightarrow\ Z_m\ \textit{unmatchedElsif} \\
&\mid\ Z_m \\
&\mid\ Z_u \\
&\mid\ E_u
\end{aligned}
$$