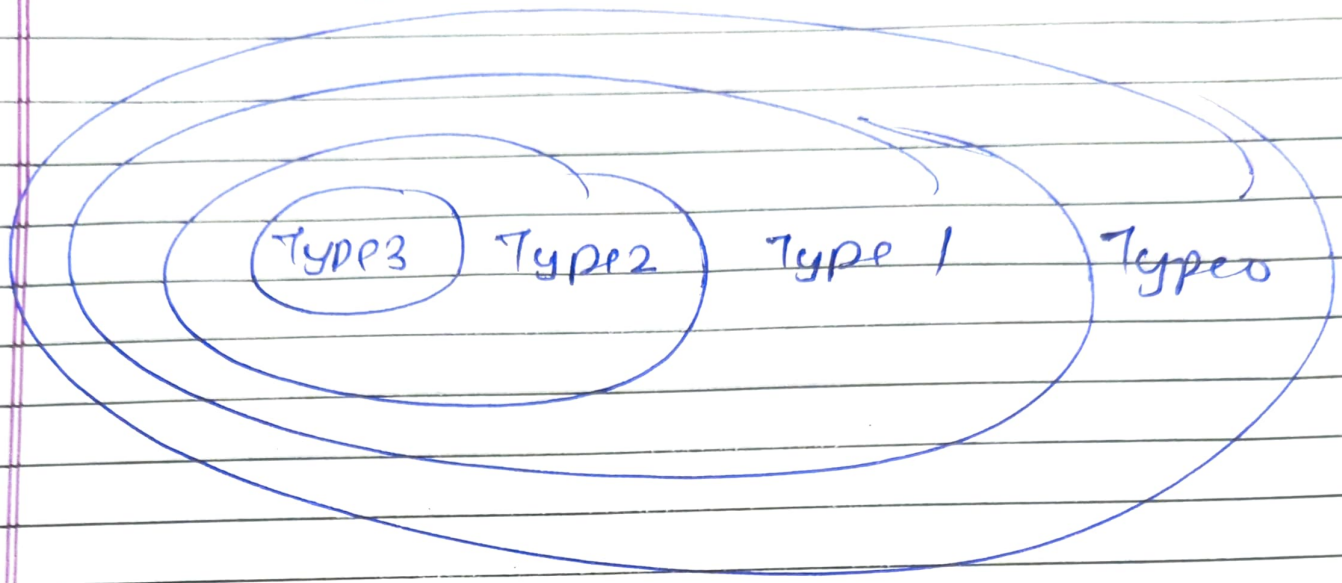
CHOMSKY HIERARCHY



Type 3 grammar :- Regular Grammar for R. Languages

$\alpha \rightarrow \beta$

$\alpha \in V$

$\beta \in T / TV$

↓

Right Linear Grammar

eg. $S \rightarrow aA$
$A \rightarrow aB$
$B \rightarrow a$

non terminal is on RHS.

$\alpha \in V$

$\beta \rightarrow T / VT$

↓

Left Linear Grammar

eg:- $S \rightarrow Aa$
$A \rightarrow Aa$
$B \rightarrow a$

non terminal is on LHS

eg:- $S \to aA$
$A \to Bb$
$B \to c$

} it not a Type 3 Grammar because one production is Right linear and other is left linear

Type 2 Context free Grammar

$$\alpha \to \beta$$

$\alpha \in V$

$\beta \in (V \cup T)^*$

eg:- $S \to \lambda$
$A \to C$
$A \to Aa$
$A \to aB$
$B \to aa$
$B \to Ab$

} on LHS only one variable is there and on RHS everything is acceptable. All combinations of a Σ

Type 1 Context Sensitive Grammar

$\alpha \rightarrow \beta$

$\alpha \in (V \cup T)^* V (V \cup T)^*$

$\beta \in (V \cup T)^+$

Is this means λ is not allowed on RHS

ie $A \rightarrow \lambda$ is not a production of type 1 grammar

$|\alpha| \leq |\beta|$

length of α is less or equal to β

on LHS atleast one variable is there and along with that any combination of V & T is possible

Eg:- $S \rightarrow aA$

$Aa \rightarrow abA$

$abA \rightarrow b$ not valid bcz $|\alpha|$ should be less than or equal to β

$abA \rightarrow baBb$

$AS \rightarrow bC$

$C \rightarrow E$

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Type 0 unrestricted grammar

$\alpha \rightarrow \beta$

$\alpha \in (V+T)^* V (V+T)^*$

$\beta \in (V+T)^*$

no restrictions except that atleast one variable on lhs

no restriction of length of α and β.