



TM  $\Leftrightarrow$  program

$$P^* \times Q \times P^*$$

fa.

$$L(M) = \{ x \in \Sigma^* \mid (\varepsilon, q_0, x) \Rightarrow_M^* (\alpha, f, \beta), f \in F, \alpha, \beta \in P^* \}$$

recursively enumerable

$$L_p = \{ 0^p \mid p \in \{0\}^* \mid p \text{ is prime} \}$$

$$L_{\text{ex8.8}} = \{ 0^{m \cdot n} \in \{0,1\}^* \mid 0^m 1 0^n \Rightarrow 0^{m \cdot n}, m \cdot n = \dots \}$$

어른 vs 어린이  
 차임 - 배려  
 감회에 안나온다?  
 3번  
 대학생 - 조보어른

TM may or not halt for some  $x \in \Sigma^*$   $\rightarrow$  type 0 vs 1

Nondeterminism! E. Dijkstra.  $\rightarrow$  Guarded Command, Nondeterminacy...  
 automatic Generation of Programs

if  $x \geq y \rightarrow m := x$   
 $\square x \leq y \rightarrow m := y$   
 fi

if  $x \geq y \rightarrow m := x$   
 $\square x \leq y \rightarrow m := y$   
 fi

if?  $x > y \rightarrow m := x$   
 $x \leq y \rightarrow m := y$   
 fi

vs if  $x > y \rightarrow m := x$   
 $\square x < y \rightarrow m := y$   
 fi

vs if  $x > y \rightarrow$  A Discipline of Programs  
 $\square x = y$   
 $\square x < y$   
 fi

if then else fi  
 vs  
 if - then  
 else if  
 else if

vs if  $B_1 \rightarrow S_1$   
 $\square B_2 \rightarrow S_2$   
 $\vdots$   
 $\square B_n \rightarrow S_n$   
 fi

$\rightarrow$  Nondeterminism.  
 $\rightarrow$  Binary vs n-ary

格物致知  
 誠意正心

# 3 Nondeterminancy vs Deterministic

인간은?

계산은? Computable?

Programmable?

↳ 생각은?  
변경 @ ???

$g_1, g_2, g_3, g_4 := Q_1, Q_2, Q_3, Q_4$

do

$g_1 > g_2 \rightarrow g_1, g_2 := g_2, g_1$

$\square g_2 > g_3 \rightarrow g_2, g_3 := g_3, g_2$

$\square g_3 > g_4 \rightarrow g_3, g_4 := g_4, g_3$

od

생각 통제

① loop invariance?

② " termination?  $\rightarrow$  positive monotonically decreasing ftn.

목표

~~or~~  $g_1 \leq g_2 \leq g_3 \leq g_4$