

## FUNCIONES Y PREDICADOS QUE EXPLORAN EL COMPORTAMIENTO DE LOS PROGRAMAS

- ◆ Función universal

$$\Phi(x, y) \cong \varphi_x(y)$$

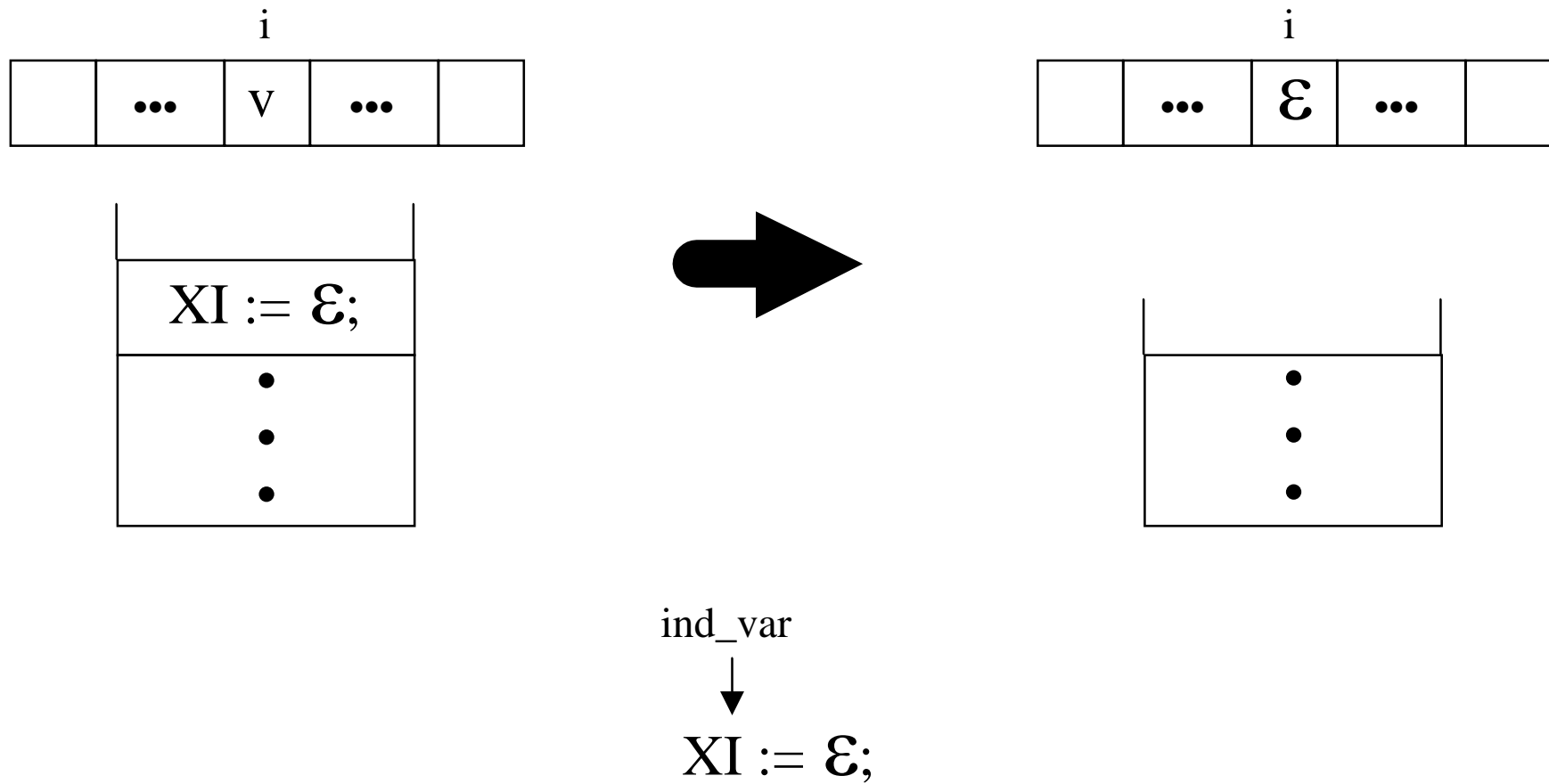
- ◆ Predicado T

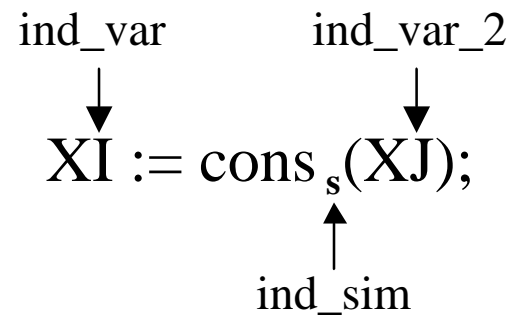
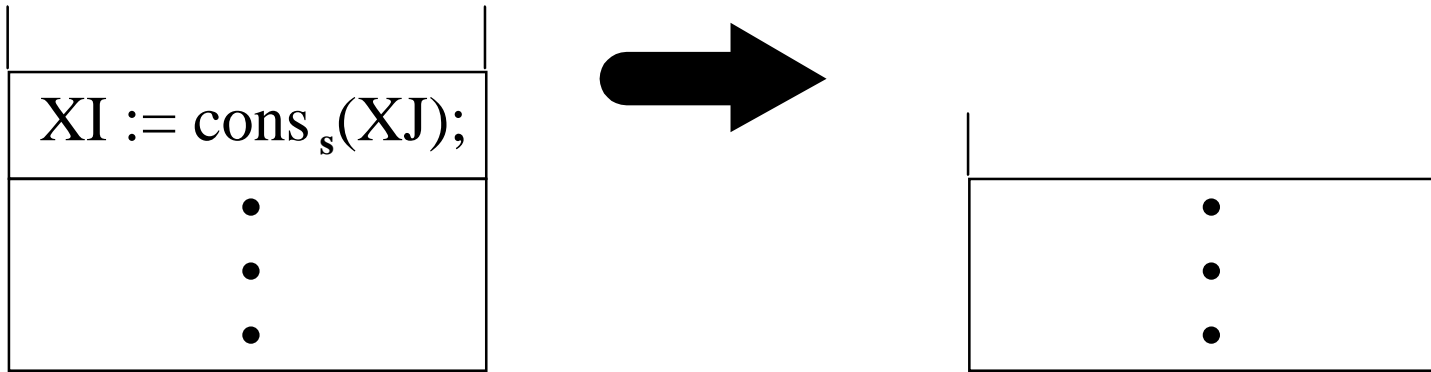
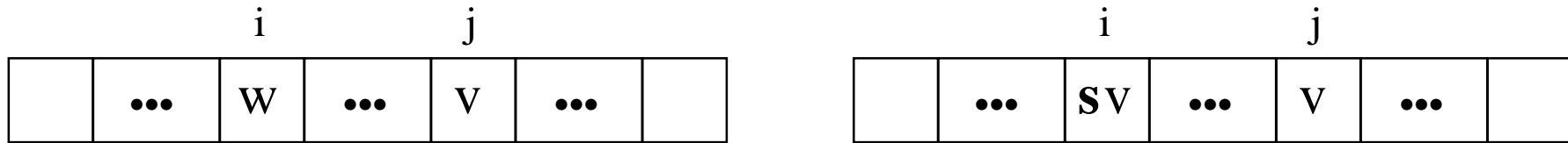
$$T(x, y, p) \leftrightarrow \varphi_x(y) \downarrow \text{ en } p \text{ o menos pasos}$$

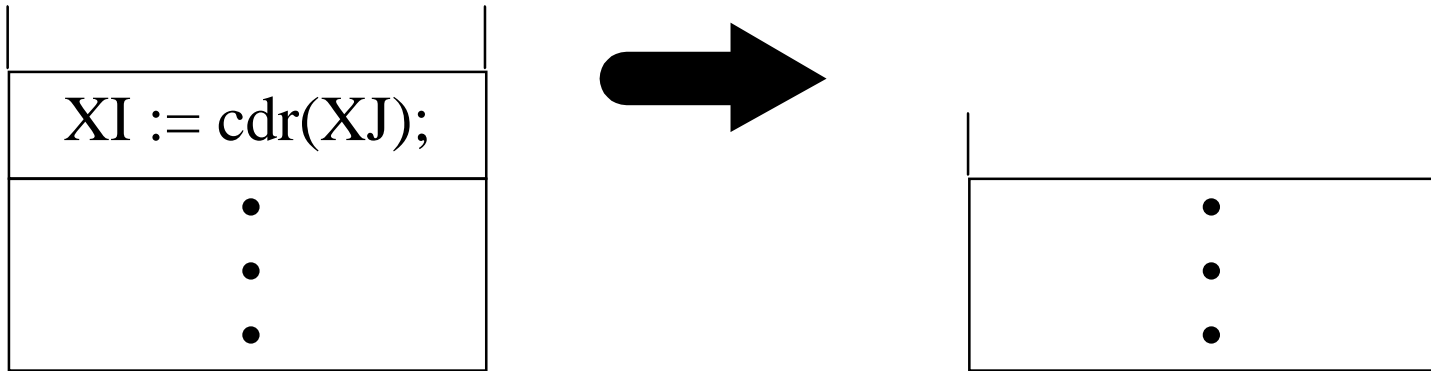
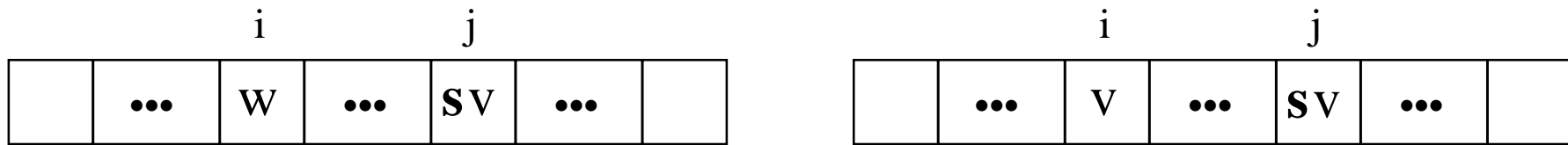
- ◆ Predicado E

$$E(x, y, p, z) \leftrightarrow T(x, y, p) \wedge \varphi_x(y) = z$$

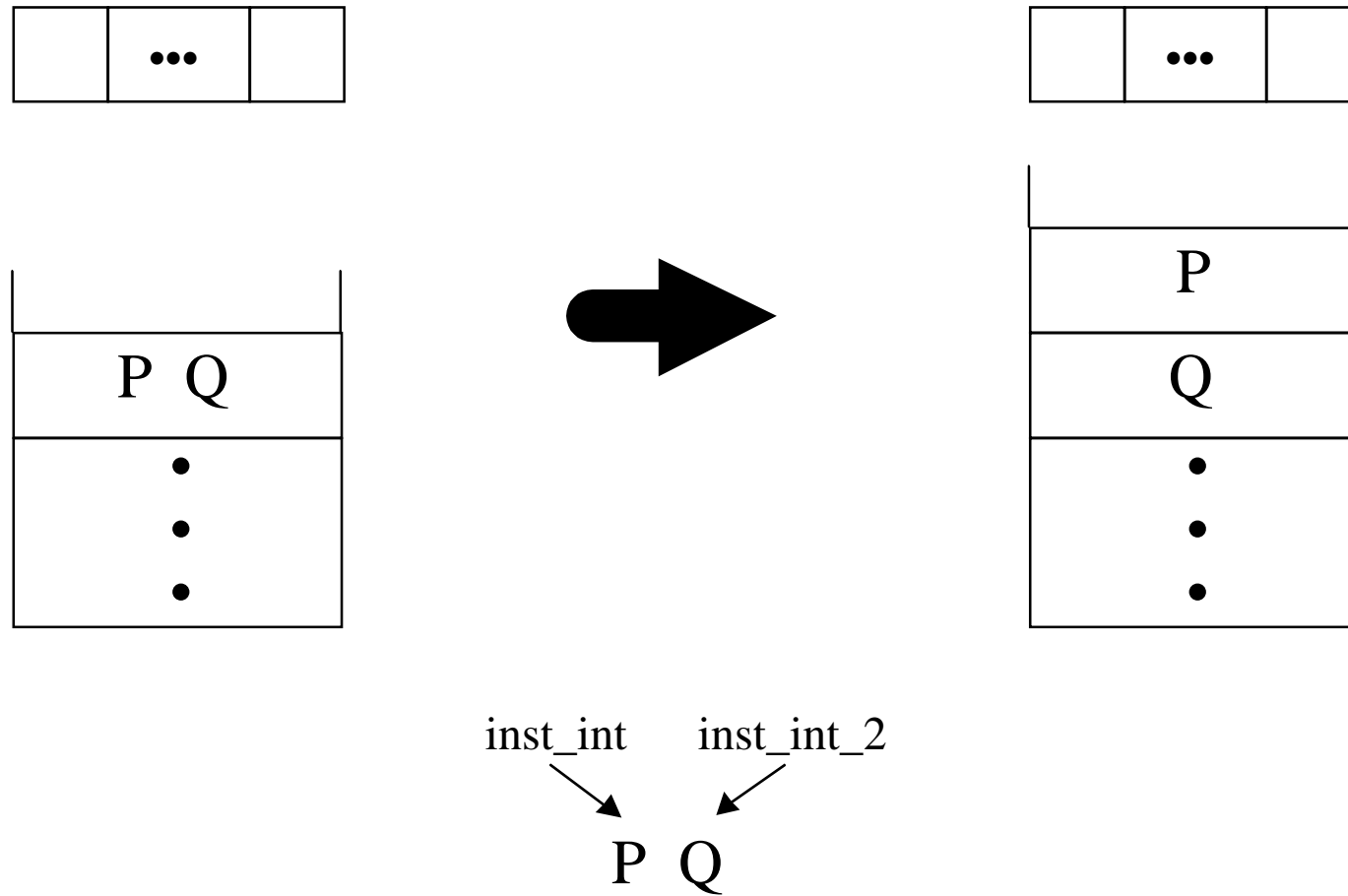
# PILA DE PROCESOS Y VECTOR DE ESTADO EN LA FUNCIÓN UNIVERSAL

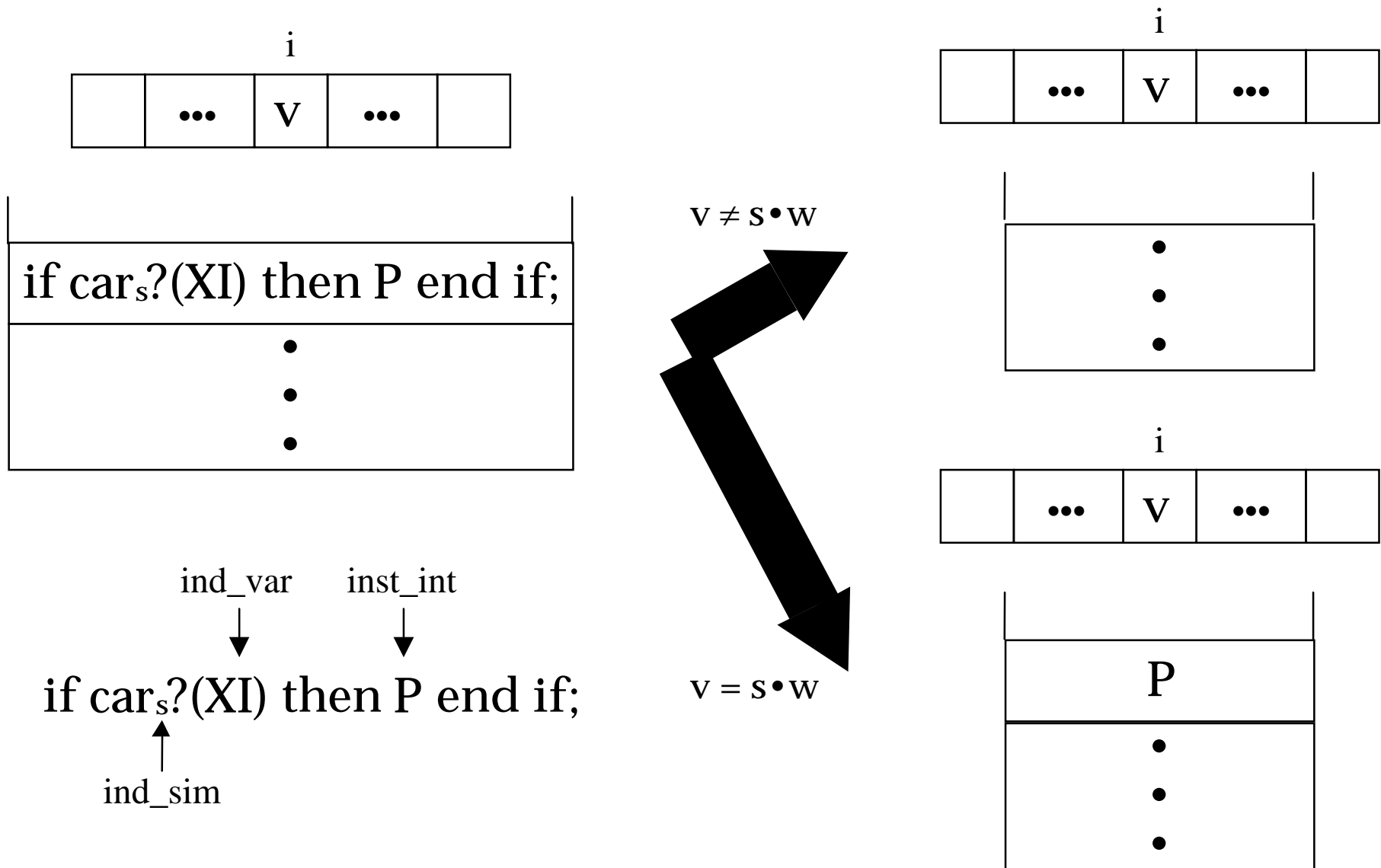


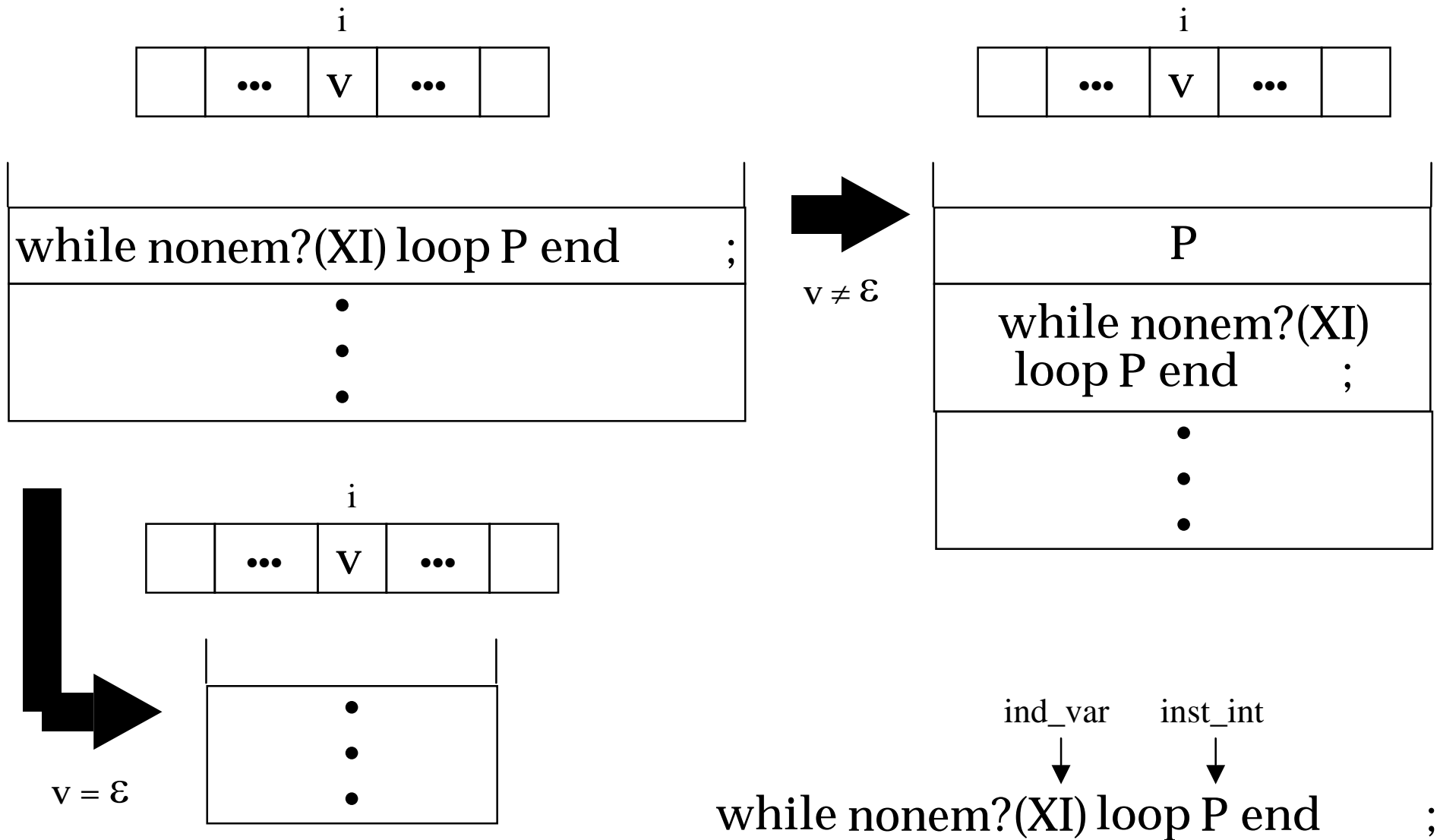




$ind\_var$        $ind\_var\_2$   
 $\downarrow$              $\downarrow$   
 $XI := cdr(XJ);$







## FUNCION UNIVERSAL

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VARS:= ( $\epsilon$ ); VARS(ult_variable(X1)):=  $\epsilon$ ;
VARS(1):= X2; P I L A := empilar( X1, <] );
while not P_vacía?(P I L A) loop
    PROG := cima(P I L A); P I L A := desempilar(P I L A);
    if asig_vacía?(PROG) then VARS(ind_var(PROG)) :=  $\epsilon$ ;
    elsif asig_cons?(PROG) then
        VARS(ind_var(PROG)) :=
            ind_simb(PROG)•VARS(ind_var_2(PROG));
    elsif asig_cdr?(PROG) then
        VARS(ind_var(PROG)) :=
            cdr(VARS(ind_var_2(PROG)));
    elsif composición?(PROG) then
        P I L A := empilar(inst_int(PROG),
            empilar(inst_int_2(PROG), P I L A));
    elsif condición?(PROG) then
        if ind_simb(PROG) =
            primero(VARS(ind_var(PROG))) then
            P I L A := empilar(inst_int(PROG), P I L A); end if;
    elsif iteración?(PROG) then
        if nonem?(VARS(ind_var(PROG))) then
            P I L A := empilar(inst_int(PROG),
                empilar(PROG, P I L A)); end if;
    end if;
end loop;
X0 :=VARS(0);

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## EL PREDICADO T

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VARS := ( $\epsilon$ ); VARS(ult_variable(X1)) :=  $\epsilon$ ; VARS(1) := X2;
PILA := empilar( X1, < ] ); PASOS := 0;
while not P_vacía?(PILA) and PASOS  $\leq$  X3 loop
  PROG := cima(PILA); PILA := desempilar(PILA);
  if asig_vacía?(PROG) then PASOS := PASOS+1;
    VARS(ind_var(PROG)) :=  $\epsilon$ ;
  elsif asig_cons?(PROG) then PASOS := PASOS+1;
    VARS(ind_var(PROG)) :=
      ind_simb(PROG)•VARS(ind_var_2(PROG));
  elsif asig_cdr?(PROG) then PASOS := PASOS+1;
    VARS(ind_var(PROG)) :=
      cdr(VARS(ind_var_2(PROG)));
  elsif composición?(PROG) then
    PILA := empilar(inst_int(PROG),
      empilar(inst_int_2(PROG), PILA));
  elsif condición?(PROG) then PASOS := PASOS+1;
    if ind_simb(PROG) =
      primero(VARS(ind_var(PROG))) then
      PILA := empilar(inst_int(PROG), PILA); end if;
  elsif iteración?(PROG) then PASOS := PASOS+1;
    if nonem?(VARS(ind_var(PROG))) then
      PILA := empilar(inst_int(PROG),
        empilar(PROG, PILA)); end if;
    end if;
end loop;
X0 := P_vacía?(PILA);

```