Execution Semantics of Pattern/Scope Combinations

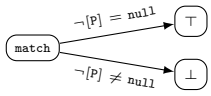
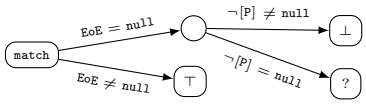
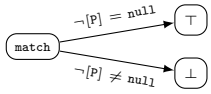
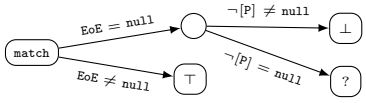
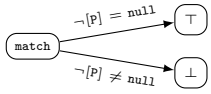
Pattern/scope combinations	QRE semantics and verdict procedure
always P after Q	EoE | (Q P* (¬[P] | EoE)) 
always P after Q until R	EoE | (Q P* (¬[P] | R | EoE)) 
always P before Q	EoE | Q | ¬[P] 
always P between Q and R	EoE | (Q P* ¬[P] P* (R | EoE) 
always P globally	EoE | ¬[P] 

Table 1: Semantics of Universality patterns as QREs and verdict procedures.

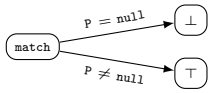
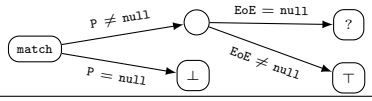
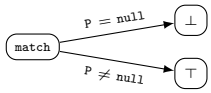
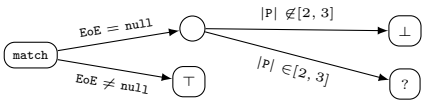
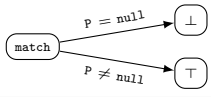
Pattern/scope combinations	QRE semantics and verdict procedure
exists [2,3] P **after** Q	EoE | (Q (¬[P]* P' (¬[P]* P (¬[P]* P (¬[P]* P' | EoE) | EoE) | EoE) | EoE)) 
exists [2,3] P **after** Q **until** R	EoE | (Q (¬[P]* P' (¬[P]* P (¬[P]* P (¬[P]* P' | R | EoE) | R | EoE) | R | EoE) | R | EoE)) 
exists [2,3] P **before** Q	¬[P]* P' (¬[P]* P (¬[P]* P (¬[P]* P' | Q | EoE) | Q | EoE) | Q | EoE) | Q | EoE 
exists [2,3] P **between** Q **and** R	EoE | Q ¬[P,R]* (P ¬[P,R]*)* (R | EoE) 
exists [2,3] P **globally**	¬[P]* P' (¬[P]* P (¬[P]* P (¬[P]* P' | EoE) | EoE) | EoE) | EoE 

Table 2: Semantics of Existence patterns as QREs and verdict procedures.

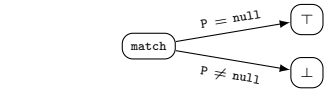
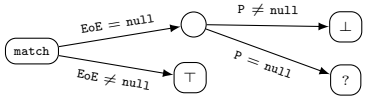
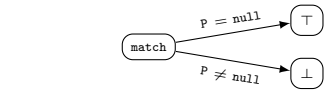
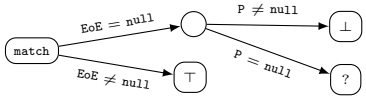
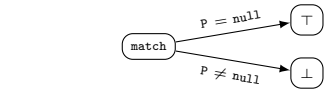
Pattern/scope combinations	QRE semantics and verdict procedure
never P after Q	EoE | (Q .*? (P | EoE)) 
never P after Q until R	EoE | (Q .*? (P | R | EoE)) 
never P before Q	EoE | Q | P 
never P between Q and R	EoE | (Q ¬[P]* (P ¬[P]*?)? (R | EoE) 
never P globally	EoE | P 

Table 3: Semantics of Absence patterns as QREs and verdict procedures.

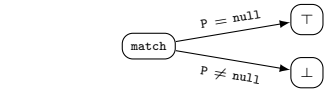
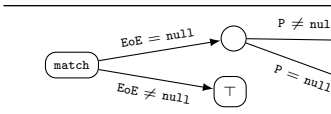
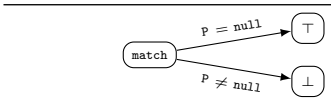
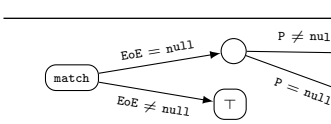
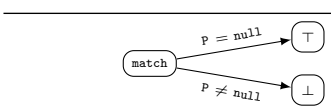
Pattern/scope combinations	QRE semantics and verdict procedure
S precedes P after Q	EoE | Q .*? (EoE | S | P) 
S precedes P after Q until R	EoE | Q .*? (EoE | R | S | P)) 
S precedes P before Q	EoE | Q | S | P 
S precedes P between Q and R	EoE | Q ¬[P,R,S]* (S ¬[R]* | P ¬[R]*)? (EoE | R) 
S precedes P globally	EoE | S | P 

Table 4: Semantics of Precedence patterns as QREs and verdict procedures.

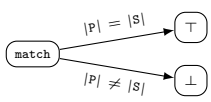
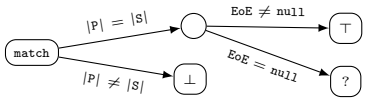
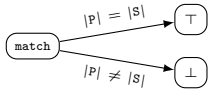
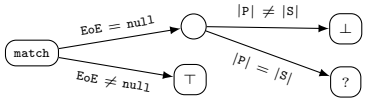
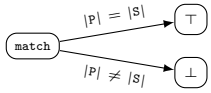
Pattern/scope combinations	QRE semantics and verdict procedure
S **respondsTo** P **after** Q	EoE | Q ¬[P]* (P ¬[S]* S ¬[P]*)* (P ¬[S]*)? EoE 
S **respondsTo** P **after** Q **until** R	EoE | Q ¬[P,R]* (P ¬[R,S]* S ¬[P,R]*)* (P ¬[R,S]*)? (R | EoE) 
S **respondsTo** P **before** Q	EoE | Q | (P ¬[S]* S ¬[P]*)* (P ¬[S]*)? (EoE | Q) 
S **respondsTo** P **between** Q **and** R	EoE | Q ¬[P,R]* (P ¬[R,S]* S ¬[P,R]*)* (P ¬[R,S]*)? (R | EoE) 
S **respondsTo** P **globally**	(P ¬[S]* S ¬[P]*)* (P ¬[S]*)? EoE 

Table 5: Semantics of Response patterns as QREs and verdict procedures.