Table1: The correspondence between the proposed taxonomy and the one in ChangeDistiller for changes occurring within declarations. *P*1–*P*6 **stands for pattern** *NonCommonTokens, ContainingCommonTokens, EncapsulationLR, EncapsulationRL, MovingAcrossElements,* **and** *OrderingChange,* **respectively. The asterisk in the root element column of each declaration means that all the root elements listed below occur. The asterisk in column types and change patterns have similar meanings.**

Root Element	Types	Patterns	Distiller entity	Distiller types
ClassOrInterfaceDeclaration				
*	*	*	CLASS	ADDITIONAL_CLASS REMOVED_CLASS
inheritpart	A/D/C ClassOrInterfaceDeclaration_inheritpart	P1/P2	PARAMETERIZED_TYPE QUALIFIED_TYPE SINGLE_TYPE	PARENT_CLASS_CHANGE PARENT_CLASS_DELETE PARENT_CLASS_INSERT PARENT_INTERFACE_CHANGE PARENT_INTERFACE_DELETE PARENT_INTERFACE_INSERT
inherits	C ClassOrInterfaceDeclaration_inherits	P1		
name	C ClassOrInterfaceDeclaration_name	P1	CLASS	ADDITIONAL_CLASS REMOVED_CLASS CLASS_RENAMING
modifier	A/D/C ClassOrInterfaceDeclaration_modifier	P1	MODIFIER	ADDING_CLASS_DERIVABILITY REMOVING_CLASS_DERIVABILITY DECREASING_ACCESSIBILITY_CHANGE INCREASING_ACCESSIBILITY_CHANGE UNCLASSIFIED_CHANGE
typeparameter	A TypeParameter_typebound D ClassOrInterfaceDeclaration_typeparameter		TYPE_PARAMETER	UNCLASSIFIED_CHANGE
ConstructorDeclaration				
*	*	*	METHOD	ADDITIONAL_FUNCTIONALITY REMOVED_FUNCTIONALITY
modifier	A/D/C ConstructorDeclaration_modifier	P1	MODIFIER	DECREASING_ACCESSIBILITY_CHANGE INCREASING_ACCESSIBILITY_CHANGE
parameter	A/D/C ConstructorDeclaration_parameter A/D Parameter_modifier C Parameter_name/type D VariableDeclaratorId_arraycount	P1/P2/P6	PARAMETER ARRAY_TYPE PARAMETERIZED_TYPE QUALIFIED_TYPE SINGLE_TYPE	PARAMETER_DELETE PARAMETER_ORDERING_CHANGE PARAMETER_INSERT PARAMETER_RENAMING PARAMETER_TYPE_CHANGE
MethodDeclaration				
*	*	*	METHOD	ADDITIONAL_FUNCTIONALITY REMOVED_FUNCTIONALITY
name	C MethodDeclaration_name	P1	METHOD	METHOD_RENAMING
modifier	A/D/C MethodDeclaration_modifier	P1	MODIFIER	ADDING_METHOD_OVERRIDABILITY REMOVING_METHOD_OVERRIDABILITY INCREASING_ACCESSIBILITY_CHANGE DECREASING_ACCESSIBILITY_CHANGE UNCLASSIFIED_CHANGE
type	C MethodDeclaration_type	P1/P2	ARRAY_TYPE	RETURN_TYPE_CHANGE PARAMETERIZED_TYPE QUALIFIED_TYPE
parameter	A/D/C MethodDeclaration_parameter A/D Parameter_isvarargs/modifier C Parameter_name/type	P1/P2/P6	PARAMETER ARRAY_TYPE PARAMETERIZED_TYPE QUALIFIED_TYPE SINGLE_TYPE	PARAMETER_DELETE PARAMETER_INSERT PARAMETER_ORDERING_CHANGE PARAMETER_RENAMING PARAMETER_TYPE_CHANGE

Table 1: Continued.

Root Element	Types	Patterns	Distiller entity	Distiller types
FieldDeclaration				
*	*	*	FIELD	ADDITIONAL_OBJECT_STATE ATTRIBUTE_RENAMING REMOVED_OBJECT_STATE
modifier	A/D/C FieldDeclaration_modifier	P1	MODIFIER	ADDING_ATTRIBUTE_MODIFIABILITY DECREASING_ACCESSIBILITY_CHANGE INCREASING_ACCESSIBILITY_CHANGE REMOVING_ATTRIBUTE_MODIFIABILITY UNCLASSIFIED_CHANGE
type	C FieldDeclaration_type	P1/P2	ARRAY_TYPE	ATTRIBUTE_TYPE_CHANGE PARAMETERIZED_TYPE QUALIFIED_TYPE SINGLE_TYPE
variable	A/D/C FieldDeclaration_variable A/D/C VariableDeclarator_init A ArrayCreationExpr_arraycount C ArrayCreationExpr_initializer/type C VariableDeclarator_id C MethodCallExpr_arg/name/scope C BinaryExpr_left/right A/D/C ObjectCreationExpr_arg C ObjectCreationExpr_type	P1/P2/ P3/P4/ P6	FIELD/ CLASS_INSTANCE _CREATION	REMOVED_OBJECT_STATE ADDITIONAL_OBJECT_STATE ATTRIBUTE_RENAMING ATTRIBUTE_TYPE_CHANGE STATEMENT_UPDATE STATEMENT_DELETE

Table 2: The correspondence between the proposed taxonomy and the one in ChangeDistiller for changes occurring within statements. *P1–P6* **stands for pattern** *NonCommonTokens, ContainingCommonTokens, EncapsulationLR, EncapsulationRL, MovingAcrossElements,* **and** *OrderingChange,* **respectively.** *STMT_DEL* **stands for** *STATEMENT_DELETE, STMT_INS* **for** *STATEMENT_INSERT, STMT_UPD* **for** *STATEMENT_UPDATE, CON_EXPR_CHG* **for** *CONDITION_EXPRESSION_CHANGE, STMT_ORD* **for** *STATEMENT_ORDERING_CHANGE,* **and** *STMT_PAR_CHG* **for** *STATEMENT_PARENT_CHANGE.*

Root Entity	Root Element	Change type	Patterns	Distiller entity	Distiller types
ObjectCreationStmt	arg	A/D/C ObjectCreationExpr_arg C MethodCallExpr_arg/name C BinaryExpr_right	P1/P2/ P3/P4	CLASS_INSTANCE _CREATION	STMT_INS/STMT_DEL/ STMT_PAR_CHG STMT_UPD
	type	C ObjectCreationExpr_type	P1		STMT_UPD
UnaryExprStmt	expr	C UnaryExpr_expr C CastExpr_type C FieldAccessExpr_name	P1/P2/ P3/P4	POSTFIX_EXPRESSION	STMT_DEL/STMT_INS/ STMT_UPD/STMT_ORD/ STMT_PAR_CHG
	op	C UnaryExpr_op	P1		STMT_ORD
	expr	C UnaryExpr_expr	P1	PREFIX_EXPRESSION	STMT_INS /STMT_DEL
ForeachStmt	iterable	C ForeachStmt_iterable A/D/C MethodCallExpr_arg/scope C MethodCallExpr_name	P1/P2/ P3/P4	FOREACH_STATEMENT	CON_EXPR_CHG/ STMT_DEL/STMT_INS/ /STMT_PAR_CHG/ STMT_ORD
	var	C ForeachStmt_var C VariableDeclarationExpr_type/variable	P1/P2		
ForStmt	compare	A/D/C ForStmt_compare C BinaryExpr_left/op/right C ConditionalExpr_elseexpr C FieldAccessExpr_name/scope C MethodCallExpr_name/scope C UnaryExpr_expr	P1/P2/ P3/P4/P5	FOR_STATEMENT	CON_EXPR_CHG/ STMT_DEL/STMT_INS/ STMT_ORD / STMT_PAR_CHG
	init	A/D/C ForStmt_init C AssignExpr_target/value C BinaryExpr_left/right C FieldAccessExpr_name/scope C MethodCallExpr_name/scope A/D/C VariableDeclarationExpr_variable C VariableDeclarationExpr_type C VariableDeclarator_id/init	P1/P2/ P3/P4	FOR_STATEMENT/ VARIABLE _DECLARATION _STATEMENT	CON_EXPR_CHG/ STMT_DEL/STMT_INS/ STMT_ORD/ STMT_PAR_CHG
	update	A/D/C ForStmt_update C AssignExpr_target A/D MethodCallExpr_arg C UnaryExpr_expr/op	P1/P2/ P6	FOR_STATEMENT/ ASSIGNMENT/ METHOD_INVOCATION/ POSTFIX_EXPRESSION/ PREFIX_EXPRESSION	CON_EXPR_CHG/ STMT_DEL/STMT_UPD/ STMT_INS/ STMT_PAR_CHG
IfStmt	condition	A/D/C IfStmt_condition C ArrayAccessExpr_index/name C AssignExpr_target/value C BinaryExpr_left/op/right C CastExpr_expr/type C CharLiteralExpr_value C ConditionalExpr_elseexpr/thenexpr C EnclosedExpr_inner C FieldAccessExpr_name/scope C InstanceOfExpr_expr/type A/D/C MethodCallExpr_arg/scope C MethodCallExpr_name A/D/C ObjectCreationExpr_arg C UnaryExpr_expr	P1/ P2/ P3/P4/ P5/P6	IF_STATEMENT	CON_EXPR_CHG/ STMT_DEL/STMT_INS STMT_ORD/ STMT_PAR_CHG

Table 2: Continued.

Root Entity	Root Element	Type	Patterns	Distiller entity	Distiller types
MethodCallStmt	arg	A/D/C MethodCallExpr_arg/scope C MethodCallExpr_ name/typearg C ArrayAccessExpr_index/name C ArrayCreationExpr_dimension/initializer/type A/D ArrayCreationExpr_arraycount A/D/C ArrayInitializerExpr_values C AssignExpr_target/value C BinaryExpr_left/op/right C CastExpr_expr/type C CharLiteralExpr_value C ClassExpr_type C ConditionalExpr_condition/elseexpr/thenexpr C EnclosedExpr_inner C FieldAccessExpr_name/scope A/D/C ObjectCreationExpr_arg C ObjectCreationExpr_ type C UnaryExpr_expr	P1/P2/ P3/P4/ P5/ P6	METHOD _INVOCATION	STMT_DEL/STMT_INS/ STMT_ORD/ STMT_PAR_CHG STMT_UPD
	name	C MethodCallExpr_name	P1		
	scope	A/D/C MethodCallExpr_scope A/C MethodCallExpr_arg C ArrayAccessExpr_index/name C BinaryExpr_left/right C CastExpr_expr/type C ConditionalExpr_elseexpr/thenexpr C FieldAccessExpr_name/scope C MethodCallExpr_ name C ObjectCreationExpr_ type A/D/C ObjectCreationExpr_arg	P1/ P2/ P3/P4/P5		
VariableDeclStmt	annotation	A VariableDeclarationExpr_annotation		VARIABLE_ DECLARATION_ STATEMENT	STMT_DEL/STMT_INS/ STMT_UPD/STMT_ORD STMT_PAR_CHG
	modifier	A/D VariableDeclarationExpr_modifier			
	type	C VariableDeclarationExpr_type	P1/P2		
	variable	A/D/C VariableDeclarationExpr_variable A/D/C VariableDeclarator_init C VariableDeclarator_id A/D VariableDeclaratorId_arraycount C CastExpr_expr/type C ArrayAccessExpr_index/name A/D/C ArrayInitializerExpr_values A/D ArrayCreationExpr_arraycount A/C ArrayCreationExpr_dimension C ArrayCreationExpr_ initializer/type C AssignExpr_target/value C BinaryExpr_left/op/right C ConditionalExpr_condition/elseexpr/thenexpr C CharLiteralExpr_value C EnclosedExpr_inner C FieldAccessExpr_name/scope C InstanceOfExpr_expr C MethodCallExpr_name A/D/C MethodCallExpr_arg/scope A/D MethodCallExpr_ typearg A/D/C ObjectCreationExpr_arg C ObjectCreationExpr_scope/type C UnaryExpr_expr	P1/P2/ /P3/P4/ P5/P6		

Table 2: Continued.

Root Entity	Root Element	Types	Patterns	Distiller entity	Distiller types
AssertStmt	check	C AssertStmt_check C BinaryExpr_left/op C InstanceOfExpr_type C MethodCallExpr_scope	P1/P2/P4	ASSERT_STATEMENT	STMT_UPD
	msg	A/C AssertStmt_msg C BinaryExpr_left	P1	ASSERT_STATEMENT	STMT_UPD
BreakStmt	id	A/D/C BreakStmt_id	P1	BREAK_STATEMENT	STMT_INS/STMT_DEL /STMT_UPD
CatchClause	except	C CatchClause_except C Parameter_name/type	P1/P2	CATCH_CLAUSE	STMT_INS/STMT_DEL /STMT_UPD/STMT_ORD
ContinueStmt	id	A/D/C ContinueStmt_id	P1	CONTINUE_STATEMENT	STMT_DEL/STMT_INS /STMT_DEL
DoStmt	condition	C DoStmt_condition C AssignExpr_target/value C BinaryExpr_left/op/right C FieldAccessExpr_scope D/C MethodCallExpr_scope C MethodCallExpr_name	P1/P2/ P3/P4/P5	DO_STATEMENT	CON_EXPR_CHG/ STMT_INS/STMT_DEL
ConstructorInvoc	arg	A/D/C ExplicitConstructorInvocationStmt_arg C ArrayCreationExpr_initializer C BinaryExpr_left/right C CastExpr_expr C ConditionalExpr_condition/elseexpr C FieldAccessExpr_name/scope A/D/C MethodCallExpr_arg CMethodCallExpr_ name/scope/typearg A/D/C ObjectCreationExpr_arg	P1/P2/ P3/P4/ P5/ P6	CONSTRUCTOR _INVOCATION	STMT_DEL/STMT_INS/ STMT_UPD
	isthis	C ExplicitConstructorInvocationStmt_isthis	P1		
AssignExprStmt	op	C AssignExpr_op	P1/P2/ P3/P4	ASSIGNMENT	STMT_DEL/ STMT_INS/ STMT_UPD/ STMT_ORD/ STMT_PAR_CHG
	target	C AssignExpr_target C ArrayAccessExpr_index/name C BinaryExpr_left/right C CastExpr_expr/type C ConditionalExpr_elseexpr/thenexpr C FieldAccessExpr_name/scope C MethodCallExpr_name C UnaryExpr_expr			
	value	C AssignExpr_target/value A/D ArrayCreationExpr_arraycount A/D/C ArrayCreationExpr_ dimension/initializer C ArrayAccessExpr_index/name C ArrayCreationExpr_ type A/D/C ArrayInitializerExpr_values C BinaryExpr_left/op/right C CastExpr_expr/type C CharLiteralExpr_value C ConditionalExpr_condition/elseexpr/thenexpr C EnclosedExpr_inner C FieldAccessExpr_name/scope A/D/C MethodCallExpr_arg/scope A/C MethodCallExpr_typearg C MethodCallExpr_name A/D/C ObjectCreationExpr_arg C ObjectCreationExpr_ type C UnaryExpr_expr	P1/P2/ P3/P4/ P5/ P6		

Table2: Continued.

Root Entity	Root Element	Types	Patterns	Distiller Entity	Distiller Types
ReturnStmt	expr	A/D/C ReturnStmt_expr C CastExpr_expr/type C ArrayAccessExpr_index/name D ArrayCreationExpr_arraycount/initializer A ArrayCreationExpr_arraycount/dimension C ArrayCreationExpr_dimension/initializer/type A/D/C ArrayInitializerExpr_values C AssignExpr_target/value C BinaryExpr_left/op/right C CharLiteralExpr_value C ClassExpr_type C ConditionalExpr_condition/elseexpr/thenexpr C EnclosedExpr_inner C FieldAccessExpr_name/scope C InstanceOfExpr_expr/type A/D/C MethodCallExpr_arg/scope/typearg C MethodCallExpr_name A/D/C ObjectCreationExpr_arg C ObjectCreationExpr_type C UnaryExpr_expr	P1/P2/ P3/P4/ P5/P6	RETURN_STATEMENT	STMT_INS/STMT_DEL/ STMT_UPD/STMT_ORD/ STMT_PAR_CHG
SwitchEntryStmt	label	C SwitchEntryStmt_label C BinaryExpr_left/op/right C CastExpr_expr C CharLiteralExpr_value C FieldAccessExpr_name/scope	P1/ P2/ P3/P4	SWITCH_CASE	STMT_INS/STMT_DEL/ STMT_UPD/STMT_ORD STMT_PAR_CHG
SwitchStmt	selector	C SwitchStmt_selector C ArrayAccessExpr_index/name C BinaryExpr_left/right C FieldAccessExpr_name/scope A/D/C MethodCallExpr_arg/scope C MethodCallExpr_name	P1/P2/ P3/P4	SWITCH_STATEMENT	STMT_INS/STMT_DEL/ STMT_UPD/STMT_ORD STMT_PAR_CHG
SynchronizedStmt	expr	C SynchronizedStmt_expr	P1/P3/P4	SYNCHRONIZED _STATEMENT	STMT_INS/STMT_DEL/ STMT_UPD
ThrowStmt	expr	C ThrowStmt_expr C ArrayAccessExpr_name C BinaryExpr_left/right C CastExpr_expr/type C ConditionalExpr_elseexpr C FieldAccessExpr_name/scope A/D/C MethodCallExpr_arg/scope C MethodCallExpr_ name A/D/C ObjectCreationExpr_arg C ObjectCreationExpr_type	P1/P2/ P3/P4/P6	THROW_STATEMENT	STMT_INS/STMT_DEL/ STMT_UPD/STMT_ORD STMT_PAR_CHG
WhileStmt	condition	C WhileStmt_condition C ArrayAccessExpr_index/name C AssignExpr_target/value C BinaryExpr_left/op/right C FieldAccessExpr_name/scope C InstanceOfExpr_expr/type A/D/C MethodCallExpr_scope A/C MethodCallExpr_arg C MethodCallExpr_name C UnaryExpr_expr	P1/P2/ P3/P4/P5	WHILE_STATEMENT	CON_EXPR_CHG/ STMT_DEL/STMT_INS/ STMT_PAR_CHG