	Fix pattern	Calculated cluster	Manual Cluster	Expanded TBar FP
1	Insert a null pointer checker with return Insert: (IF_STATEMENT, BINARY_EXPRESSION_EQUALS, NAME_EXPRESSION, SIMPLE_NAME, NULL_LITERAL_EXPRESSION, BLOCK_STATEMENT, RETURN_STATEMENT, BOOLEAN_LITERAL_EXPRESSION_FALSE)	**cha-14**$_{1..4}$	**cha-14**$_{1..4}$	Insert Null Pointer Checker and Return Literal (FP2.6): + if (exp == null) return literal;
2	Insert a zero checker Insert: (IF_STATEMENT, BINARY_EXPRESSION_NOT_EQUALS, NAME_EXPRESSION, SIMPLE_NAME, INTEGER_LITERAL_EXPRESSION, BLOCK_STATEMENT)	**tim-3**$_{1..10}$	**tim-3**$_{1..10}$	Insert Zero Checker (FP4.4.1): + if (var != 0) { + statement; ... + }
3	Insert an if block with a statement Insert: (IF_STATEMENT, METHOD_CALL_EXPRESSION, NAME_EXPRESSION, SIMPLE_NAME, SIMPLE_NAME, NAME_EXPRESSION, SIMPLE_NAME, BLOCK_STATEMENT), Insert: (BLOCK_STATEMENT), Insert: (EXPRESSION_STATEMENT, METHOD_CALL_EXPRESSION, SIMPLE_NAME, NAME_EXPRESSION, SIMPLE_NAME, NAME_EXPRESSION, SIMPLE_NAME, NAME_EXPRESSION, SIMPLE_NAME, NAME_EXPRESSION, SIMPLE_NAME)	**cli-22**$_1$, **clo-58**, **jaC-2**$_1$	**cli-22**$_1$, **jaC-2**$_1$, jaC-9$_1$	Insert if Block with Statement (FP4.4.2): + if (conditional_exp) { + statement; ... + }
4			**clo-58**	Insert if-else Block with Statement (FP4.4.3): + if (conditional_exp) {... + } else { + statement; ... + }
5	Insert an assignment Insert: (EXPRESSION_STATEMENT, ASSIGN_EXPRESSION, NAME_EXPRESSION, SIMPLE_NAME, NULL_LITERAL_EXPRESSION)	**com-2**$_1$, **jaD-87**$_1$, **jso-39**	**com-2**$_1$, **jaD-87**$_1$, **jso-39**	Insert Assignment with Literal (FP4.5.1.): + var = literal
6	Insert a method invocation Insert: (METHOD_CALL_EXPRESSION) Insert: (SIMPLE_NAME)	clo-90$_1$, **jso-73**$_1$, **jso-86**, lan-4, moc-23$_1$	**jso-86**	Mutate Method Invocation Expr. (FP10.1.1): - method1() + method2().method3()
7			**jso-73**$_1$	Mutate Object and Method (FP13.1.3): - obj1.method1(args) + obj2.method2().method1(args)
8	Insert a method invocation Insert: (BINARY_EXPRESSION_OR), Insert: (METHOD_CALL_EXPRESSION, NAME_EXPRESSION, SIMPLE_NAME, SIMPLE_NAME)	**clo-3**$_1$, clo-113, jaD-110, jso-51, jso-56$_1$	**clo-3**$_1$ -	Mutate Method Invocation Expr. (FP10.4.1): - method1() + method1(arg)
9	Remove a method invocation Delete: (METHOD_CALL_EXPRESSION), Delete: (SIMPLE_NAME)	**cli-1**$_{1,2}$, jaD-95$_1$, **jso-4**, **jso-8**	**jso-8**	Mutate Method Invocation Expr. (FP10.6): - method1().method2() + method3()
10			**cli-1**$_{1,2}$, **jso-4**	Remove Method Invocation (FP15.3): - method()
11	Remove a field access Delete: (FIELD_ACCESS_EXPRESSION), Delete: (SIMPLE_NAME)	**lan-60**$_1$, **mat-49**$_{1..4}$, **mat-98**$_{1,2}$	**lan-60**$_1$, **mat-49**$_{1..4}$, **mat-98**$_{1,2}$	Mutate Object (FP13.1.1): - obj.attr + var
12	Insert a variable Insert: (NAME_EXPRESSION), Insert: (SIMPLE_NAME)	cli-18$_1$, clo-144$_1$, **jso-66**$_1$, moc-19$_1$	**jso-66**$_1$	Mutate Object (FP13.1.2): - obj1.method() + obj2.method()
13	Insert a variable Insert: (NAME_EXPRESSION, SIMPLE_NAME)	clo-165$_1$, clo-175$_1$, clo-30$_1$, clo-37$_1$, clo-79$_1$, com-43$_{1,2}$, **jaD-103**$_{1..22}$, jaD-52, jaD-75$_1$, jaD-97, jso-66$_1$, lan-26, mat-70, moc-21$_1$, moc-25$_1$, moc-30$_1$, moc-35$_1$, tim-26$_{1..8}$	**jaD-103**$_{1..22}$	Mutate Object and Method (FP13.4.2): - obj1.method1() + obj2.method2(obj1)
14	Insert a method invocation and an attribute Insert: (METHOD_CALL_EXPRESSION), Insert: (SIMPLE_NAME), Insert: (NAME_EXPRESSION, SIMPLE_NAME)	**jaD-25**$_{1..3}$, jaD-3$_1$	**jaD-25**$_{1..4}$	Mutate Object and Method (FP13.4.2): - obj1.method1(obj2) + obj3.method2().method3(obj1, obj2)
15	Change: (PRIMITIVE_TYPE_BOOLEAN) to (CLASS_OR_INTERFACE_TYPE), Insert: (SIMPLE_NAME)	**clo-169**$_{1..5}$	**clo-169**$_{1..5}$	Mutate Method Definition (FP16): - modifier T method(T1 arg1, ...) ... + modifier T method(T2 arg2, ...) ...

Table 1: Fix patterns (based on JavaParser AST node types) and centroids of clusters that extend TBar fix pattern (FP) taxonomy.