

**RQ2: Operator Performance Metrics (Rates % and Deltas)**

Operator	Exec	NE	EHR	IR	cEHR	$\Delta\mu$	$\Delta\sigma$
ConceptAdditionOperator	E01	62.99	1.57	35.43	2.44	-0.08	0.12
ConceptAdditionOperator	E02	51.54	4.62	41.54	7.89	-0.06	0.14
ConceptAdditionOperator	E03	48.87	9.02	41.35	15.38	-0.03	0.10
ConceptAdditionOperator	E04	52.45	3.50	42.66	6.10	-0.05	0.13
ConceptAdditionOperator	E05	53.23	9.68	35.48	15.00	-0.03	0.11
ConceptAdditionOperator	E06	62.50	1.56	35.16	2.41	-0.05	0.13
ConceptAdditionOperator	E07	58.41	1.77	38.05	2.86	-0.07	0.15
<b>ConceptAdditionOperator</b>	<b>Mean</b>	<b>55.71</b>	<b>4.53</b>	<b>38.52</b>	<b>7.44</b>	<b>-0.05</b>	<b>0.13</b>
InformedEvolutionOperator	E01	54.33	6.30	39.37	10.39	-0.20	0.10
InformedEvolutionOperator	E02	54.62	13.08	30.00	18.89	-0.21	0.12
InformedEvolutionOperator	E03	49.62	16.54	31.58	24.72	-0.17	0.12
InformedEvolutionOperator	E04	58.04	3.50	36.36	5.62	-0.19	0.10
InformedEvolutionOperator	E05	38.71	14.52	46.77	27.27	-0.13	0.11
InformedEvolutionOperator	E06	57.81	7.03	34.38	10.71	-0.16	0.09
InformedEvolutionOperator	E07	30.97	7.08	61.95	18.60	-0.13	0.11
<b>InformedEvolutionOperator</b>	<b>Mean</b>	<b>49.16</b>	<b>9.72</b>	<b>40.06</b>	<b>16.60</b>	<b>-0.17</b>	<b>0.11</b>
LLMBackTranslation_HI	E01	62.99	4.72	31.50	6.90	-0.08	0.13
LLMBackTranslation_HI	E02	70.00	4.62	23.08	6.00	-0.07	0.14
LLMBackTranslation_HI	E03	72.18	9.02	15.79	10.81	-0.05	0.10
LLMBackTranslation_HI	E04	68.53	2.80	22.38	3.60	-0.08	0.12
LLMBackTranslation_HI	E05	74.19	4.84	17.74	5.88	-0.05	0.10
LLMBackTranslation_HI	E06	75.00	1.56	21.09	1.98	-0.08	0.12
LLMBackTranslation_HI	E07	74.34	5.31	15.93	6.32	-0.08	0.13
<b>LLMBackTranslation_HI</b>	<b>Mean</b>	<b>71.03</b>	<b>4.70</b>	<b>21.07</b>	<b>5.93</b>	<b>-0.07</b>	<b>0.12</b>
LLMBasedParaphrasing	E01	59.06	2.36	37.80	3.80	-0.08	0.12
LLMBasedParaphrasing	E02	62.31	2.31	34.62	3.53	-0.08	0.13
LLMBasedParaphrasing	E03	48.87	6.77	43.61	12.00	-0.03	0.11
LLMBasedParaphrasing	E04	53.85	1.40	43.36	2.47	-0.07	0.11
LLMBasedParaphrasing	E05	46.77	7.26	44.35	13.04	-0.03	0.09
LLMBasedParaphrasing	E06	57.03	0.78	42.19	1.35	-0.06	0.13
LLMBasedParaphrasing	E07	55.75	3.54	40.71	5.97	-0.08	0.13
<b>LLMBasedParaphrasing</b>	<b>Mean</b>	<b>54.81</b>	<b>3.49</b>	<b>40.95</b>	<b>6.02</b>	<b>-0.06</b>	<b>0.12</b>
POSAwareSynonymReplacement	E01	78.74	3.15	10.24	3.81	-0.07	0.11
POSAwareSynonymReplacement	E02	70.00	10.00	16.15	11.93	-0.06	0.12
POSAwareSynonymReplacement	E03	70.68	8.27	18.05	10.28	-0.03	0.08
POSAwareSynonymReplacement	E04	79.72	4.20	10.49	4.84	-0.06	0.11
POSAwareSynonymReplacement	E05	72.58	8.06	16.13	9.71	-0.06	0.10
POSAwareSynonymReplacement	E06	84.38	3.12	8.59	3.51	-0.06	0.13
POSAwareSynonymReplacement	E07	75.22	10.62	12.39	12.24	-0.04	0.13
<b>POSAwareSynonymReplacement</b>	<b>Mean</b>	<b>75.90</b>	<b>6.77</b>	<b>13.15</b>	<b>8.05</b>	<b>-0.05</b>	<b>0.11</b>
MLM	E01	61.42	4.72	23.62	7.06	-0.05	0.10
MLM	E02	60.00	6.15	25.38	9.09	-0.06	0.15
MLM	E03	58.65	10.53	26.32	15.22	-0.03	0.09
MLM	E04	62.24	5.59	25.17	8.00	-0.05	0.11
MLM	E05	57.26	7.26	27.42	10.98	-0.06	0.11
MLM	E06	71.88	3.12	20.31	4.12	-0.07	0.12
MLM	E07	53.10	3.54	37.17	6.15	-0.04	0.13
<b>MLM</b>	<b>Mean</b>	<b>60.65</b>	<b>5.84</b>	<b>26.48</b>	<b>8.66</b>	<b>-0.05</b>	<b>0.12</b>
NegationOperator	E01	76.38	1.57	13.39	1.98	-0.10	0.12
NegationOperator	E02	69.23	6.92	20.77	8.91	-0.06	0.14
NegationOperator	E03	58.65	9.02	26.32	12.37	-0.03	0.10
NegationOperator	E04	67.13	3.50	24.48	4.72	-0.08	0.13
NegationOperator	E05	75.81	2.42	18.55	3.00	-0.04	0.09
NegationOperator	E06	86.72	3.12	7.81	3.45	-0.08	0.13
NegationOperator	E07	66.37	7.96	20.35	10.34	-0.06	0.12
<b>NegationOperator</b>	<b>Mean</b>	<b>71.47</b>	<b>4.93</b>	<b>18.81</b>	<b>6.40</b>	<b>-0.06</b>	<b>0.12</b>
SOSAwareAntonymReplacement	E01	84.25	5.51	3.94	6.09	-0.06	0.12
SOSAwareAntonymReplacement	E02	83.08	10.77	3.08	11.29	-0.06	0.14
SOSAwareAntonymReplacement	E03	82.71	11.28	4.51	11.90	-0.04	0.11
SOSAwareAntonymReplacement	E04	85.31	4.20	4.90	4.62	-0.07	0.12
SOSAwareAntonymReplacement	E05	84.68	8.87	4.84	9.40	-0.05	0.10
SOSAwareAntonymReplacement	E06	83.59	3.91	10.16	4.42	-0.05	0.11
SOSAwareAntonymReplacement	E07	84.07	6.19	3.54	6.80	-0.06	0.12
<b>SOSAwareAntonymReplacement</b>	<b>Mean</b>	<b>83.96</b>	<b>7.25</b>	<b>5.00</b>	<b>7.79</b>	<b>-0.06</b>	<b>0.12</b>
SemanticFusionCrossover	E01	34.62	1.92	59.62	4.88	-0.08	0.09
SemanticFusionCrossover	E02	45.45	2.73	49.09	5.36	-0.06	0.11
SemanticFusionCrossover	E03	36.21	1.72	61.21	4.55	-0.03	0.08
SemanticFusionCrossover	E04	37.50	3.68	57.35	8.62	-0.04	0.10
SemanticFusionCrossover	E05	42.86	6.12	50.00	12.24	-0.02	0.09
SemanticFusionCrossover	E06	43.40	0.94	55.66	2.13	-0.06	0.09
SemanticFusionCrossover	E07	38.16	1.32	59.21	3.23	-0.09	0.08
<b>SemanticFusionCrossover</b>	<b>Mean</b>	<b>39.74</b>	<b>2.63</b>	<b>56.02</b>	<b>5.86</b>	<b>-0.05</b>	<b>0.09</b>
SemanticSimilarityCrossover	E01	35.58	3.85	0.00	9.76	-0.07	0.09
SemanticSimilarityCrossover	E02	23.64	4.55	0.00	16.13	-0.06	0.11
SemanticSimilarityCrossover	E03	15.52	3.45	0.00	18.18	-0.05	0.10
SemanticSimilarityCrossover	E04	25.00	0.00	0.00	0.00	-0.08	0.09
SemanticSimilarityCrossover	E05	10.20	3.06	0.00	23.08	-0.02	0.10
SemanticSimilarityCrossover	E06	33.96	0.94	0.00	2.70	-0.07	0.08
SemanticSimilarityCrossover	E07	9.21	0.00	0.00	0.00	-0.00	0.09
<b>SemanticSimilarityCrossover</b>	<b>Mean</b>	<b>21.87</b>	<b>2.26</b>	<b>0.00</b>	<b>9.98</b>	<b>-0.05</b>	<b>0.09</b>
StylisticMutator	E01	62.20	0.79	35.43	1.23	-0.10	0.13
StylisticMutator	E02	51.54	2.31	44.62	4.17	-0.08	0.13
StylisticMutator	E03	54.89	4.51	39.10	7.41	-0.04	0.11
StylisticMutator	E04	55.24	1.40	41.96	2.41	-0.06	0.11
StylisticMutator	E05	62.90	3.23	33.87	4.88	-0.05	0.11
StylisticMutator	E06	51.56	3.12	44.53	5.63	-0.06	0.12
StylisticMutator	E07	58.41	4.42	36.28	6.94	-0.07	0.11
<b>StylisticMutator</b>	<b>Mean</b>	<b>56.68</b>	<b>2.83</b>	<b>39.40</b>	<b>4.67</b>	<b>-0.07</b>	<b>0.12</b>
TypographicalErrorsOperator	E01	47.24	4.72	45.67	8.70	-0.06	0.12
TypographicalErrorsOperator	E02	41.54	3.08	53.85	6.67	-0.08	0.12
TypographicalErrorsOperator	E03	42.11	3.76	53.38	8.06	-0.07	0.11