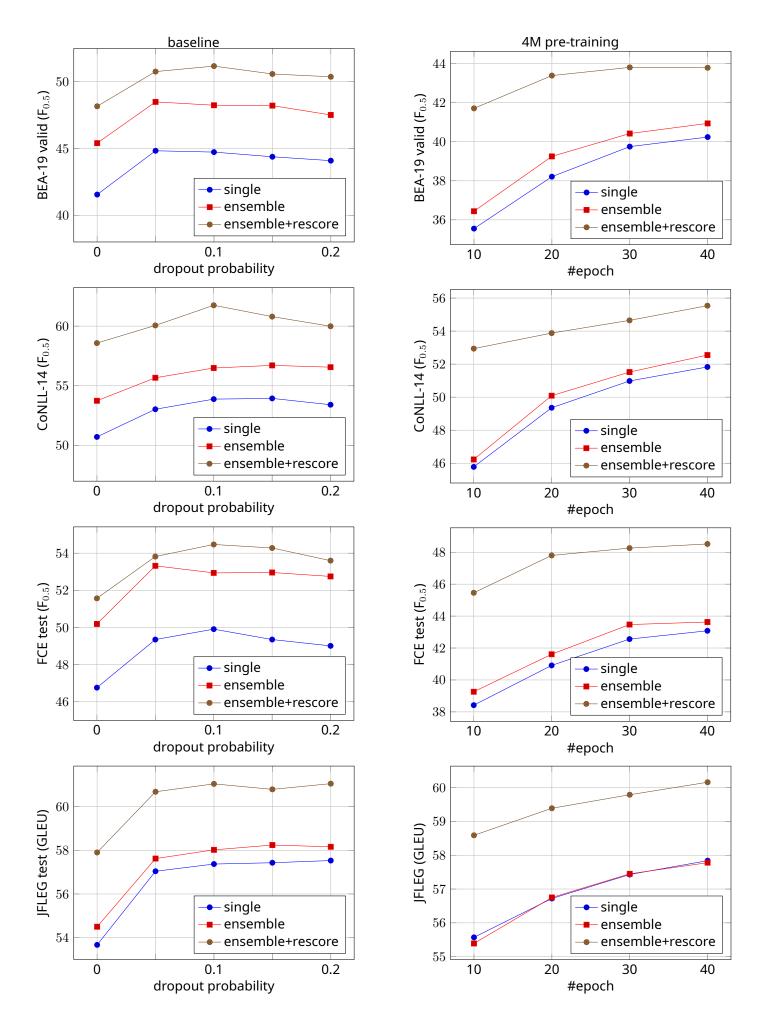
	main result															
	BEA-19 (CoNLL-13 CoNLL-14				FCE				JFLEG		
	valid t			test	test (valid) (test)			valid test				valid	test			
	Р	R	F _{0.5}	Р	R	F _{0.5}	F _{0.5}	P	R	F _{0.5}	F _{0.5}	P	R	F _{0.5}	GLEU	GLEU
	baseli	ne														
single	52.13	28.54	44.73	-	-	-	37.18	66.35	30.82	53.88	51.47	58.56	31.46	49.91	52.57	57.37
ensemble	58.37	28.47	48.24	70.07	46.91	63.78	37.58	72.24	30.17	56.49	55.20	63.68	31.61	52.94	52.77	58.02
+ rescore	59.15	33.23	51.17	69.97	53.45	65.90	43.37	70.27	41.59	61.75	55.64	63.78	34.38	54.47	55.55	61.04
	pre-tr	aining														
single	52.58	22.96	41.79	-	-	-	37.48	66.43	32.43	54.92	43.61	56.53	26.77	46.24	52.97	58.35
ensemble	53.51	22.77	42.14	65.93	44.89	60.28	37.28	67.23	32.26	55.25	44.58	57.51	26.78	46.77	53.05	58.55
+ rescore	53.35	27.19	44.74	66.01	51.10	62.37	40.14	63.51	39.15	56.48	46.95	56.77	31.15	48.75	54.79	60.10
	pre-tr	aining	+ fine-t	uning												
single	60.61	35.03	52.83	-	-	-	46.74	70.82	44.44	63.25	56.12	64.25	38.02	56.40	56.45	62.23
ensemble	62.38	34.94	53.91	76.61	58.67	72.19	48.18	73.57	44.64	65.13	57.33	66.32	37.96	57.70	56.79	62.72
ensemble + rescore	61.75	37.50	54.68	75.79	61.81	72.51	49.74	70.82	50.16	65.43	57.48	65.50	39.48	57.87	58.17	63.69
	pre-tr	aining	+ fine-t	uning	+ doma	ain ada	ptation	1								
single	58.33	42.36	54.24	-	-	-	i -	-	-	-	56.69	64.21	40.83	57.59	-	-
ensemble	61.11	43.09	56.39	74.89	64.54	72.57	-	-	-	-	58.38	66.63	40.95	59.21	-	-
ensemble + rescore	60.93	43.75	<u>56.49</u>	74.84	65.51	72.76	-	-	-	-	58.51	65.39	42.54	59.05	-	-

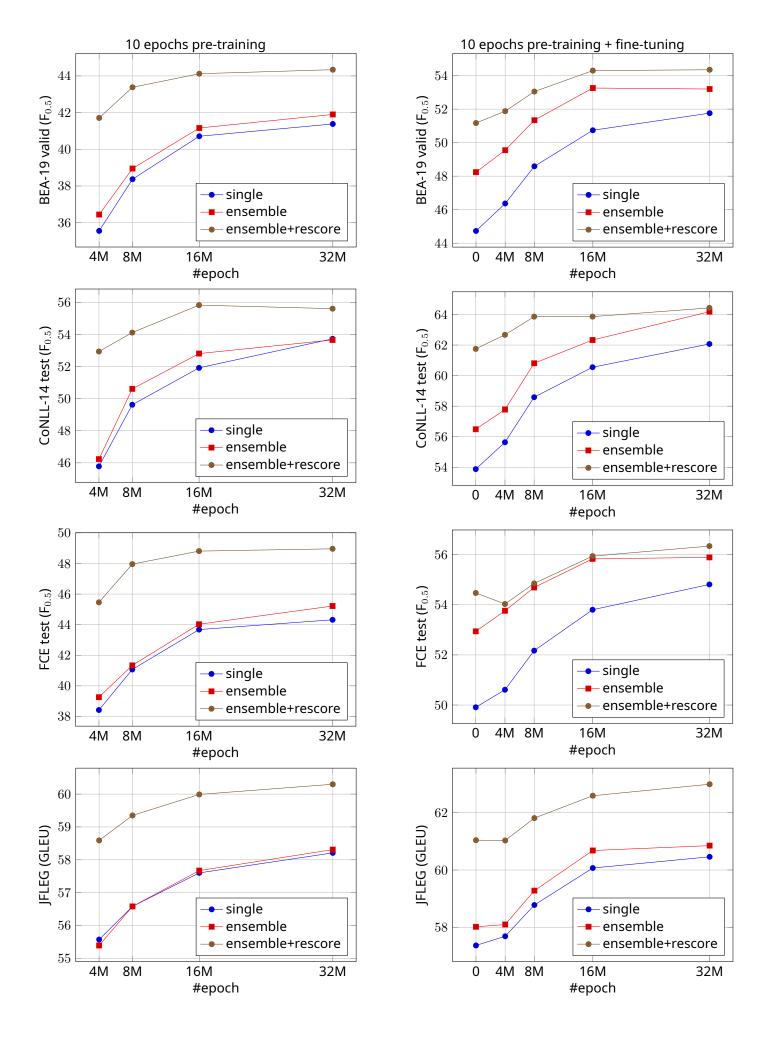
pre-trained model										
		A-19 va	_		ONLL-1			FCE tes		EG test
	P // // // // // // // // // // // // //	R 0 epoc	+ _{0.5}	Р	R	F _{0.5}	Р	R	F _{0.5}	GLEU
single	47.11		35.55	59.77	23.66	45.78	49.11	20.55	38.42	55.57
ensemble	49.21		36.44	61.42	23.24	46.23		20.55	39.26	55.39
ensemble + rescore	50.18		41.71	62.18	33.20	52.94	55.50	26.38	45.46	58.59
ainala		20 epoc		C2 44	26.07	40.261	F0 72	22.06	40.01	FC 72
single ensemble	50.97	20.38 20.44	39.25	62.44 64.25	26.87 26.62	49.36 50.09	52.11	23.06 23.04	41.61	56.72 56.75
ensemble + rescore			43.39	61.17	36.49	53.88	56.10	30.03	47.80	59.39
		80 ерос								
single		21.79		63.35	28.63	50.98	52.09	24.59	42.56	57.43
ensemble	51.56			64.60	28.48	51.52	53.77	24.62	43.47	57.45
ensemble + rescore		20.42 10 epoc	43.81	61.85	37.28	54.65	56.89	30.03	48.26	59.79
single	50.38	22.31	40.24	63.76	29.66	51.83	52.62	24.98	43.08	57.84
ensemble	51.72	22.32	40.94	65.13	29.65	52.55	53.63	24.99	43.63	57.78
ensemble + rescore		27.54		63.45	37.07	55.54	56.52	30.97	48.52	60.16
ata ata		0 epoc		62.76	27.04	40.621	F4 44	22.70	44.071	FC F0
single ensemble	49.54 51.10	20.18 19.97	38.37 38.95	62.76 65.16	27.01 26.73	49.62 50.61	51.41 52.16	22.78 22.60	41.07 41.34	56.58 56.58
ensemble + rescore		26.30	43.38	61.20	36.99	54.12	58.48	27.90	47.96	59.35
		20 epoc								
single	51.07	22.58	40.77	63.95	29.79	52.02	52.32	24.89	42.87	57.81
ensemble	52.66		41.47	65.11	29.61	52.52	53.92	25.08	43.84	57.92
ensemble + rescore			44.31	64.32	36.61	55.86	56.58	30.34	48.23	60.09
single		10 epo 22.33	cns 40.71	64.04	29.56	51.92	53.68	25.01	43.68	57.60
ensemble	52.41	22.14		65.78	29.52	52.81	54.41	24.97	44.03	57.67
ensemble + rescore		27.66		63.17	38.12	55.83	56.89	31.13	48.81	59.99
		5 epoc								
single	50.84		40.29	64.33	29.71	52.17	52.79	24.67	42.99	57.72
ensemble	52.43		41.05	66.85	29.51	53.35	54.53	24.88	44.04	57.67
ensemble + rescore	51.88	27.32 10 epo	43.97	62.52	38.42	55.55	56.88	30.73	48.61	59.99
single			41.38	65.41	31.35	53.73	54.04	25.78	44.32	58.21
ensemble	52.68	23.04	41.90	65.39	31.23	53.66	55.46	26.01	45.22	58.31
ensemble + rescore	52.74		44.34	63.11	37.69	55.61	56.85	31.48	48.96	60.30
pre-train x 10 epochs + fine-tuning										
		pre-tr	ain x 10	epoch:	s + fine	-tuning				
	BE	pre-tr A-19 va			s + fine			FCE tes	t JFLI	EG test
	Р	A-19 va R	lid F _{0.5}	P	ONLL-1	4 F _{0.5}	Р	FCE tes R	t JFLI F _{0.5}	EG test GLEU
	P 4M x 1	A-19 va R 0 epoc	lid F _{0.5} hs pre-1	P training	ONLL-1 R + fine-	F _{0.5}	Р	R	F _{0.5}	GLEU
single	P 4M x 1 55.50	A-19 va R 0 epoc 28.11	alid F _{0.5} hs pre-1 46.37	P training 67.98	ONLL-1 R + fine- 32.29	4 F _{0.5} tuning 55.64	P 59.17	R 32.21	F _{0.5}	GLEU 57.69
ensemble	P 4M x 1 55.50 61.53	A-19 va R 0 epoc 28.11 27.86	F _{0.5} hs pre-1 46.37 49.55	P training 67.98 73.36	R + fine- 32.29 31.25	4 F _{0.5} tuning 55.64 57.78	59.17 64.30	R 32.21 32.47	F _{0.5} 50.61 53.76	57.69 58.10
	P 4M x 1 55.50 61.53 60.45	A-19 va R 0 epoc 28.11 27.86 33.11	hs pre-1 46.37 49.55 51.88	P training 67.98 73.36 71.49	R + fine- 32.29 31.25 41.95	4 F _{0.5} tuning 55.64 57.78 62.67	P 59.17	R 32.21	F _{0.5}	GLEU 57.69
ensemble	P 4M x 1 55.50 61.53 60.45	R 0 epoc 28.11 27.86 33.11 0 epoc	hs pre-1 46.37 49.55 51.88	P training 67.98 73.36	R + fine- 32.29 31.25 41.95	4 F _{0.5} tuning 55.64 57.78 62.67	59.17 64.30 63.72	R 32.21 32.47	F _{0.5} 50.61 53.76	57.69 58.10
ensemble ensemble + rescore	P 4M x 1 55.50 61.53 60.45 8M x 1	R 0 epoc 28.11 27.86 33.11 0 epoc 29.76	hid F _{0.5} hs pre-1 46.37 49.55 51.88 hs pre-	P training 67.98 73.36 71.49 training	R + fine- 32.29 31.25 41.95 + fine-	4 F _{0.5} tuning 55.64 57.78 62.67 tuning	P 59.17 64.30 63.72 60.33 64.34	R 32.21 32.47 33.59 33.94 34.18	50.61 53.76 54.03 52.17 54.69	57.69 58.10 61.03
ensemble ensemble + rescore single	P 4M x 1 55.50 61.53 60.45 8M x 1 57.85 62.78 60.03	R 0 epoc 28.11 27.86 33.11 0 epoc 29.76 29.70 36.21	hs pre-1 46.37 49.55 51.88 hs pre-1 48.59 51.34 53.05	P training 67.98 73.36 71.49 training 69.89 74.31 70.92	R + fine- 32.29 31.25 41.95 + fine- 35.59 35.23 45.66	4 F _{0.5} tuning 55.64 57.78 62.67 tuning 58.59 60.81 63.86	P 59.17 64.30 63.72 60.33 64.34 62.80	R 32.21 32.47 33.59 33.94	50.61 53.76 54.03	57.69 58.10 61.03 58.78
ensemble ensemble + rescore single ensemble ensemble ensemble + rescore	P 4M x 1 55.50 61.53 60.45 8M x 1 57.85 62.78 60.03 16M x	R 0 epoc 28.11 27.86 33.11 0 epoc 29.76 29.70 36.21 10 epo	hlid F _{0.5} hs pre-1 46.37 49.55 51.88 hs pre-1 48.59 51.34 53.05 ochs pre	P training 67.98 73.36 71.49 training 69.89 74.31 70.92	R + fine- 32.29 31.25 41.95 + fine- 35.59 35.23 45.66 g + fine	4 F _{0.5} tuning 55.64 57.78 62.67 tuning 58.59 60.81 63.86	P 59.17 64.30 63.72 60.33 64.34 62.80	R 32.21 32.47 33.59 33.94 34.18 36.40	50.61 53.76 54.03 52.17 54.69 54.85	57.69 58.10 61.03 58.78 59.28 61.81
ensemble ensemble + rescore single ensemble ensemble + rescore single	P 4M x 1 55.50 61.53 60.45 8M x 1 57.85 62.78 60.03 16M x 58.25	R 0 epoc 28.11 27.86 33.11 0 epoc 29.76 29.70 36.21 10 epo 33.53	F _{0.5} hs pre-1 46.37 49.55 51.88 hs pre-1 48.59 51.34 53.05 chs pre-50.74	P training 67.98 73.36 71.49 training 69.89 74.31 70.92 -trainin	R + fine- 32.29 31.25 41.95 + fine- 35.59 35.23 45.66 g + fine 38.85	4 F _{0.5} tuning 55.64 57.78 62.67 tuning 58.59 60.81 63.86 e-tuning 60.55	P 59.17 64.30 63.72 60.33 64.34 62.80 60.30	R 32.21 32.47 33.59 33.94 34.18 36.40 37.61	F _{0.5} 50.61 53.76 54.03 52.17 54.69 54.85	57.69 58.10 61.03 58.78 59.28 61.81
ensemble + rescore single ensemble + rescore ensemble + rescore single ensemble + rescore	P 4M x 1 55.50 61.53 60.45 8M x 1 57.85 62.78 60.03 16M x 58.25 62.02	R 0 epoc 28.11 27.86 33.11 0 epoc 29.76 29.70 36.21 10 epo 33.53 34.03	hild F _{0.5} hs pre-1 46.37 49.55 51.88 hs pre-1 48.59 51.34 53.05 chs pre 50.74 53.26	P training 67.98 73.36 71.49 training 69.89 74.31 70.92 -trainin 70.42 73.44	R + fine- 32.29 31.25 41.95 + fine- 35.59 35.23 45.66 g + fine- 38.85 38.84	4 F _{0.5} tuning 55.64 57.78 62.67 tuning 58.59 60.81 63.86 e-tuning 60.55 62.33	P 59.17 64.30 63.72 60.33 64.34 62.80 60.30 63.18	R 32.21 32.47 33.59 33.94 34.18 36.40 37.61 38.10	50.61 53.76 54.03 52.17 54.69 54.85 53.80 55.83	57.69 58.10 61.03 58.78 59.28 61.81 60.07 60.68
ensemble ensemble + rescore single ensemble ensemble + rescore single	P 4M x 1 55.50 61.53 60.45 8M x 1 57.85 62.78 60.03 16M x 58.25 62.02 60.82	R 0 epoc 28.11 27.86 33.11 0 epoc 29.76 29.70 36.21 10 epo 33.53 34.03 38.00	F _{0.5} hs pre-146.37 49.55 51.88 hs pre-148.59 51.34 53.05 chs pre 50.74 53.26 54.30	70.42 70.11	R + fine- 32.29 31.25 41.95 + fine- 35.59 35.23 45.66 g + fine 38.85 38.84 47.07	4 F _{0.5} tuning 55.64 57.78 62.67 tuning 58.59 60.81 63.86 -tuning 60.55 62.33 63.86	P 59.17 64.30 63.72 60.33 64.34 62.80 60.30 63.18 62.64	R 32.21 32.47 33.59 33.94 34.18 36.40 37.61	F _{0.5} 50.61 53.76 54.03 52.17 54.69 54.85	57.69 58.10 61.03 58.78 59.28 61.81
ensemble + rescore single ensemble + rescore ensemble + rescore single ensemble + rescore	P 4M x 1 55.50 61.53 60.45 8M x 1 57.85 62.78 60.03 16M x 58.25 62.02 60.82	R 0 epoc 28.11 27.86 33.11 0 epoc 29.76 29.70 36.21 10 epo 33.53 34.03 38.00	F _{0.5} hs pre-146.37 49.55 51.88 hs pre-148.59 51.34 53.05 chs pre 50.74 53.26 54.30	P training 67.98 73.36 71.49 training 69.89 74.31 70.92 -trainin 70.42 73.44 70.11	R + fine- 32.29 31.25 41.95 + fine- 35.59 35.23 45.66 g + fine 38.85 38.84 47.07	4 F _{0.5} tuning 55.64 57.78 62.67 tuning 58.59 60.81 63.86 -tuning 60.55 62.33 63.86	P 59.17 64.30 63.72 60.33 64.34 62.80 60.30 63.18 62.64	R 32.21 32.47 33.59 33.94 34.18 36.40 37.61 38.10	50.61 53.76 54.03 52.17 54.69 54.85 53.80 55.83	57.69 58.10 61.03 58.78 59.28 61.81 60.07 60.68
ensemble ensemble + rescore single ensemble ensemble ensemble ensemble ensemble ensemble ensemble ensemble + rescore	P 4M x 1 55.50 61.53 60.45 8M x 1 57.85 62.78 60.03 16M x 58.25 62.02 60.82 32M x 59.58 62.06	A-19 va R 0 epoc 28.11 27.86 33.11 0 epoc 29.76 29.70 36.21 10 epo 33.53 34.03 38.00 10 epo 34.05 33.87	F _{0.5} hs pre-1 46.37 49.55 51.88 hs pre-1 48.59 51.34 53.05 chs pre-50.74 53.26 54.30 chs pre-51.76 53.20	P training 67.98 73.36 71.49 training 69.89 74.31 70.92 trainin 70.42 73.44 70.11 trainin 72.66 76.14	ONLL-1 R + fine- 32.29 31.25 41.95 + fine- 35.59 35.23 45.66 g + fine 38.85 38.84 47.07 g + fine 39.28 39.41	4 F _{0.5} tuning 55.64 57.78 62.67 tuning 58.59 60.81 63.86 tuning 60.55 62.33 63.86 tuning 62.07 64.18	P 59.17 64.30 63.72 60.33 64.34 62.80 60.30 63.18 62.64 62.47 64.13	R 32.21 32.47 33.59 33.94 34.18 36.40 37.61 38.10 39.17 36.82 36.91	50.61 53.76 54.03 52.17 54.69 54.85 53.80 55.83 55.94 54.81 55.89	57.69 58.10 61.03 58.78 59.28 61.81 60.07 60.68 62.59 60.46 60.85
ensemble ensemble + rescore single ensemble ensemble + rescore single ensemble ensemble ensemble ensemble single ensemble ensembl	P 4M x 1 55.50 61.53 60.45 8M x 1 57.85 62.78 60.03 16M x 58.25 62.02 60.82 32M x 59.58 62.06	A-19 va R 0 epoc 28.11 27.86 33.11 0 epoc 29.76 29.70 36.21 10 epo 33.53 34.03 38.00 10 epo 34.05	F _{0.5} hs pre-1 46.37 49.55 51.88 hs pre-1 48.59 51.34 53.05 chs pre 50.74 53.26 54.30 chs pre 51.76	P training 67.98 73.36 71.49 training 69.89 74.31 70.92 trainin 70.42 73.44 70.11 -trainin 72.66	CONLL-1 R + fine- 32.29 31.25 41.95 + fine- 35.59 35.23 45.66 g + fine 38.85 38.84 47.07 g + fine 39.28	F _{0.5} tuning 55.64 57.78 62.67 tuning 58.59 60.81 63.86tuning 60.55 62.33 63.86tuning 62.07	P 59.17 64.30 63.72 60.33 64.34 62.80 60.30 63.18 62.64	R 32.21 32.47 33.59 33.94 34.18 36.40 37.61 38.10 39.17	50.61 53.76 54.03 52.17 54.69 54.85 53.80 55.83 55.94	57.69 58.10 61.03 58.78 59.28 61.81 60.07 60.68 62.59
ensemble ensemble + rescore single ensemble	P 4M x 1 55.50 61.53 60.45 62.78 60.03 16M x 58.25 62.08 232M x 59.58 62.06 61.32	A-19 va R 0 epoc 28.11 27.86 33.11 0 epoc 29.76 29.70 36.21 10 epo 33.53 34.03 38.00 10 epo 34.05 33.87 37.37	hild F _{0.5} hs pre-1 46.37 49.55 51.88 hs pre-1 48.59 51.34 53.05 chs pre 50.74 53.26 54.30 chs pre-5 51.76 53.20 54.35	7 P training 67.98 73.36 71.49 training 69.89 74.31 70.92 -trainin 70.42 73.44 70.11 -trainin 72.66 76.14 70.18	NLL-1 R + fine- 32.29 31.25 41.95 + fine- 35.59 35.23 45.66 g + fine- 38.85 38.84 47.07 g + fine- 39.28 39.41 48.55	4 F _{0.5} tuning 55.64 57.78 62.67 tuning 58.59 60.81 63.86 -tuning 60.55 62.33 63.86 -tuning 60.55 62.33 63.86 -tuning 64.43	P 59.17 64.30 63.72 60.33 64.34 62.80 60.30 63.18 62.64 62.47 64.13 62.74	R 32.21 32.47 33.59 33.94 34.18 36.40 37.61 38.10 39.17 36.82 36.91	50.61 53.76 54.03 52.17 54.69 54.85 53.80 55.83 55.94 54.81 55.89	57.69 58.10 61.03 58.78 59.28 61.81 60.07 60.68 62.59 60.46 60.85
ensemble ensemble + rescore single ensemble	P 4M x 1 55.50 61.53 60.45 8M x 1 57.85 62.78 60.03 16M x 25.62.02 60.82 32M x 59.58 62.06 61.32	A-19 va R 0 epoc 28.11 27.86 33.11 0 epoc 29.76 29.70 36.21 10 epoc 33.53 34.03 38.00 10 epo 34.05 33.87 37.37	hild F _{0.5} hs pre-t 46.37 49.55 51.88 hs pre-t 48.59 51.34 53.05 ichs pre 50.74 53.26 54.30 ichs pre 51.76 53.26 54.35	P training 67.98 73.36 71.49 training 69.89 70.92 -trainin 70.42 70.11 -trainin 72.66 76.14 70.18	oNLL-1 R + fine- 32.29 31.25 41.95 + fine- 35.59 35.23 45.66 g + fine- 38.85 38.84 47.07 g + fine- 39.28 39.28 39.24 48.55	4 F _{0.5} tuning 55.64 57.78 62.67 tuning 58.59 60.81 63.86 tuning 60.55 62.33 63.86 tuning 62.07 64.18 64.43	P 59.17 64.30 63.72 60.33 64.34 62.80 60.30 63.18 62.64 62.47 64.13 62.74	R 32.21 32.47 33.59 33.94 34.18 36.40 37.61 38.10 39.17 36.82 36.91 40.01	50.61 53.76 54.03 52.17 54.69 54.85 53.80 55.83 55.94 54.81 55.89 56.34	57.69 58.10 61.03 58.78 59.28 61.81 60.07 60.68 62.59 60.46 60.85 62.99
ensemble ensemble + rescore single ensemble	P 4M x 1 55.50 61.53 8M x 1 57.85 62.78 60.03 16M x 58.25 62.02 60.82 32M x 59.58 62.06 61.32	A-19 va R 0 epoc 28.11 27.86 33.11 0 epoc 29.76 29.70 36.21 10 epo 33.53 34.03 38.00 10 epo 34.05 33.87 37.37	hild F _{0.5} hs pre-t 46.37 49.55 51.88 hs pre-t 48.59 51.34 53.05 chs pre 50.74 53.26 54.30 chs pre 51.76 53.20 54.35	P training 67.98 73.36 71.49 training 69.89 74.31 70.92 trainin 70.42 73.44 70.11 trainin 72.66 76.14 70.18	CONLL-1 R + fine- 32.29 31.25 41.95 + fine- 35.59 35.23 45.66 g + fine- 38.85 38.84 47.07 g + fine- 39.28 39.41 48.55	4 F _{0.5} tuning 55.64 57.78 62.67 tuning 58.59 60.81 63.86 tuning 60.55 62.33 63.86 tuning 62.07 64.18 64.43	P 59.17 64.30 63.72 60.33 64.34 62.80 60.30 63.18 62.64 62.47 64.13 62.74	R 32.21 32.47 33.59 33.94 34.18 36.40 37.61 38.10 39.17 36.82 36.91 40.01	50.61 53.76 54.03 52.17 54.69 54.85 53.80 55.83 55.94 54.81 55.89 56.34	57.69 58.10 61.03 58.78 59.28 61.81 60.07 60.68 62.59 60.46 60.85 62.99
ensemble ensemble + rescore single ensemble	P 4M x 1 55.50 61.53 60.45 8M x 1 57.85 62.78 60.03 16M x 58.25 62.02 60.82 32M x 59.58 62.06 61.32	A-19 va R 0 epoc 28.11 27.86 33.11 0 epoc 29.76 29.70 36.21 10 epo 33.53 34.03 38.00 10 epoc 34.05 33.87 37.37 e-traini A-19 va	hilid F _{0.5} 46.37 49.55 51.88 hs pre-t 48.59 51.34 53.05 chs pre 50.74 53.26 54.30 chs pre 51.76 53.20 54.35 ng with	P Training 67.98 73.36 71.49 training 69.89 74.31 70.92 -trainin 70.42 73.44 70.11 -trainin 72.66 76.14 70.18	ONLL-1 R + fine- 32.29 31.25 41.95 + fine- 35.59 35.23 45.66 g + fine- 38.85 38.84 47.07 g + fine 39.28 39.41 48.55	4 F _{0.5} tuning 55.64 57.78 62.67 tuning 58.59 60.81 63.86 -tuning 60.55 62.33 63.86 -tuning 64.18 64.43	P 59.17 64.30 63.72 60.33 64.34 62.80 60.30 63.18 62.64 62.47 64.13 62.74	R 32.21 32.47 33.59 33.94 34.18 36.40 37.61 38.10 39.17 36.82 36.91 40.01	50.61 53.76 54.03 52.17 54.69 54.85 53.80 55.83 55.94 54.81 55.89 56.34	57.69 58.10 61.03 58.78 59.28 61.81 60.07 60.68 62.59 60.46 60.85 62.99
ensemble ensemble + rescore single ensemble ensemble ensemble ensemble ensemble ensemble ensemble ensemble + rescore single ensemble ensemble ensemble ensemble ensemble ensemble ensemble ensemble ensemble + rescore	P 4M x 1 55.50 61.53 60.45 8M x 1 57.85 62.78 60.03 16M x 58.25 62.02 60.82 32M x 59.58 62.06 61.32 pr	A-19 va R 0 epoc 28.11 27.86 33.11 0 epoc 29.76 29.76 29.70 36.21 10 epo 33.53 34.03 38.00 10 epo 34.05 33.87 37.37 e-traini A-19 va R	hilid F _{0.5} hs pre-t 46.37 49.55 51.88 hs pre-t 48.59 51.34 53.05 chs pre 50.74 53.26 54.30 chs pre 51.76 51.76 53.20 54.35 ng with alid F _{0.5} hs pre-t	P training 67.98 73.36 73.36 74.49 training 69.89 74.31 70.92 -trainin 70.42 73.44 70.11 -trainin 72.66 76.14 70.18	ONLL-1 R + fine- 32.29 31.25 41.95 + fine- 35.59 35.23 45.66 g + fine- 38.85 38.84 47.07 g + fine- 39.28 39.28 39.24 48.55	4 F _{0.5} tuning 55.64 57.78 62.67 tuning 58.59 60.81 63.86 e-tuning 60.55 62.33 63.86 e-tuning 62.07 64.18 64.43	P 59.17 64.30 63.72 60.33 64.34 62.80 60.30 63.18 62.64 62.47 64.13 62.74	R 32.21 32.47 33.59 33.94 34.18 36.40 37.61 38.10 39.17 36.82 36.91 40.01	50.61 53.76 54.03 52.17 54.69 54.85 53.80 55.83 55.94 54.81 55.89 56.34	57.69 58.10 61.03 58.78 59.28 61.81 60.07 60.68 62.59 60.46 60.85 62.99
ensemble + rescore single ensemble ensemble ensemble ensemble ensemble ensemble ensemble + rescore single ensemble + rescore single ensemble ensemble + rescore	P 4M x 1 55.50 60.45 60.45 60.45 62.78 60.03 16M x 58.25 62.08 22.06 61.32 pr BE	A-19 va R 0 epoc 28.11 27.86 33.11 0 epoc 29.76 29.70 36.21 10 epoc 33.53 34.03 38.00 10 epoc 34.05 33.87 37.37 e-traini A-19 va R 10 epoc 33.20	Alid F _{0.5} hs pre-1 46.37 49.55 51.88 hs pre-1 48.59 51.34 53.05 chs pre- 50.74 53.26 54.30 chs pre- 51.76 53.20 54.35 ng with alid F _{0.5} hs pre-1 50.48	P training 67.98 73.36 71.49 training 69.89 74.31 70.92 trainin 70.42 73.44 70.11 trainin 72.66 76.14 70.18	ONLL-1 R + fine- 32.29 31.25 41.95 + fine- 35.59 35.23 45.66 g + fine- 38.85 38.84 47.07 g + fine- 39.28 39.41 48.55 estep + ONLL-1 R + fine- 37.67	4 F _{0.5} tuning 55.64 57.78 62.67 tuning 58.59 60.81 63.86 tuning 60.55 62.33 63.86 tuning 62.07 64.18 64.43 fine-tun 4 F _{0.5} tuning 59.60	P 59.17 64.30 63.72 60.33 64.34 62.80 60.30 63.18 62.64 62.47 64.13 62.74 hing	R 32.21 32.47 33.59 33.94 34.18 36.40 37.61 38.10 39.17 36.82 36.91 40.01 FCE tes R 37.13	50.61 53.76 54.03 52.17 54.69 54.85 53.80 55.83 55.94 54.81 55.89 56.34 55.83 55.94	57.69 58.10 61.03 58.78 59.28 61.81 60.07 60.68 62.59 60.46 60.85 62.99
ensemble ensemble + rescore single ensemble ensemble ensemble ensemble ensemble ensemble ensemble ensemble + rescore single ensemble ensemble ensemble ensemble ensemble ensemble ensemble ensemble ensemble + rescore	P 4M x 1 55.50 61.53 60.45 8M x 1 57.85 62.78 60.03 16M x 59.58 62.02 60.82 32M x 59.58 62.06 61.32 pr BE P 4M x 4 58.03 61.46	A-19 va R 0 epoc 28.11 27.86 33.11 0 epoc 29.76 29.70 36.21 10 epoc 33.53 34.03 38.00 10 epoc 34.05 33.87 37.37 e-traini A-19 va R 10 epoc 33.20	hild F _{0.5} hs pre-1 46.37 49.55 51.88 hs pre-1 48.59 51.34 53.05 chs pre 50.74 53.26 54.30 chs pre- 51.76 53.20 54.35 ng with hild F _{0.5} hs pre-1 50.48	Ptraining 67.98 73.36 71.49 training 69.89 74.31 70.92 trainin 70.42 73.44 70.11 trainin 72.66 76.14 70.18 fixed #	ONLL-1 R + fine- 32.29 31.25 41.95 + fine- 35.59 35.23 45.66 g + fine- 38.85 38.84 47.07 g + fine- 39.28 39.28 39.24 48.55	4 F _{0.5} tuning 55.64 57.78 62.67 tuning 58.59 60.81 63.86 -tuning 60.55 62.33 63.86 -tuning 62.07 64.18 64.43 F _{0.5} tuning 58.59 60.61 63.86 60.7 61.83	P 59.17 64.30 63.72 60.33 64.34 62.80 60.30 63.18 62.64 62.47 64.13 62.74 sing P	R 32.21 32.47 33.59 33.94 34.18 36.40 37.61 38.10 39.17 36.82 36.91 40.01	50.61 53.76 54.03 52.17 54.69 54.85 53.80 55.83 55.94 54.81 55.89 56.34	57.69 58.10 61.03 58.78 59.28 61.81 60.07 60.68 62.59 60.46 60.85 62.99
ensemble ensemble + rescore single ensemble ensemble ensemble + rescore single ensemble + rescore single ensemble + rescore ensemble	P 4M x 1 55.50 61.53 60.45 8M x 1 55.50 62.78 60.03 32M x 58.25 62.02 60.82 pr 8E 7 4 M x 2 58.03 61.46 60.81 8M x 2	R 0 epoc 28.11 27.86 33.11 0 epoc 29.76 30.621 10 epo 33.53 38.00 34.03 33.87 37.37 e-traini A-19 va R 0 epoc 33.53 0 epoc 33.63 33.60 33.60 33.60	alid F _{0.5} hs pre-146.37 49.55 1.88 hs pre-148.59 15.34 53.05 chs pre-15.34 53.05 chs pre-15.34 53.20 54.35 hs pre-15.34 55.26 55.26 55.26 55.26 55.26 55.26 55.26 55.26 55.26 55.26 55.26 55.26 55.26 55.26 55.26 55.27 hs pre-15.37 hs pre-1	raining 67.98 73.36 73.36 73.49 70.42 70.41 70.11 -training 72.66 76.14 70.18 fixed #	CONLL-1 R 14.95 + fine- 32.29 31.25 + fine- 35.59 4 fine- 35.59 4 5.66 g + fine- 38.85 38.84 47.07 g + fine- 38.85 8step + CONLL-1 R + fine- 37.93 46.39 46.39	4 F _{0.5} F _{0.6}	P 59.17 64.30 63.72 60.33 64.34 62.80 60.30 63.18 62.64 62.47 64.13 62.74 P 60.82 64.43 63.82	R 32.21 32.47 33.59 33.94 34.18 36.40 37.61 38.10 39.17 36.82 36.91 40.01 FCE tes R 37.13 37.55	50.61 53.76 54.03 52.17 54.69 54.85 53.80 55.83 55.94 54.81 55.89 56.34	57.69 58.10 61.03 58.78 59.28 61.81 60.07 60.68 62.59 60.46 60.85 62.99
ensemble ensemble + rescore single ensemble + rescore	P 4M x 1 55.50 61.53 60.45 55.50 61.53 60.45 57.85 62.78 60.03 16M x 58.25 62.02 60.82 32M x 59.58 61.32 PF BE P 4M x 4 56.06 61.32 FF S 55.50 60.81 60.81 50.00 60.81 50.00 60.81 50.00 60.81 50.00 60.81 50.00 60.81 50.00 60.81 50.00 60.81 50.00 60.81 50.00 60.81 50.00 60.81 50.00 60.81 50.00 60.81 50.00 60.81 50.00 60.82 50.00 60.82 50.00 60.82 50.00 60.82 50.00 60.81 50.00 6	A-19 va R 0 epoc 28.11 27.86 29.70 29.76 29.70 33.11 0 epoc 29.70 33.53 34.03 34.03 34.03 34.05 33.87 6-traini A-19 va R 0 epoc 33.62 33.36 33.36 33.36	alid F _{0.5} hs pre-46.37 49.55 15.88 hs pre-15.88 hs pre-15.88 hs pre-15.89 hs pre-15.074 48.59 fs pre-15.074	raining 67.98 73.36 73.36 73.49 raining 69.89 70.92 -trainin 70.42 -trainin 70.42 70.11 -trainin 72.66 76.14 70.18 fixed # fix	CONLL-1 R 14.95 + fine- 32.29 31.25 + fine- 35.59 34.5.66 g + fine- 38.85 38.84 47.07 g + fine- 38.85 step +- CONLL-1 R + fine- 37.93 46.39 46.39 38.02	4 F _{0.5} tuning 55.64 62.67 tuning 58.59 60.81 60.55 64 62.33 63.86 -tuning 60.55 62.07 64.18 64.43 fine-tun 4 F _{0.5} tuning 60.67 63.86 63.60 61.83 63.70 64.83 64.83 6	P 59.17 64.30 63.72 60.33 64.34 62.80 60.30 62.64 62.47 62.74 ing P 60.82 64.43 63.82 61.31	32.21 32.47 33.59 33.94 34.18 36.40 37.61 38.10 39.17 36.82 37.69 40.01 FCE tes R	F _{0.5} 50.61 53.76 54.03 52.17 54.69 54.85 53.80 55.89 55.89 56.34 t JFL F _{0.5} 53.93 56.36 56.59	57.69 58.10 61.03 58.78 59.28 61.81 60.07 60.68 62.59 60.46 60.85 62.99 EG test GLEU 59.71 60.19 61.92
ensemble ensemble + rescore single ensemble + rescore single ensemble	P 4M x 1 55.50 61.53 60.45 87.85 62.78 60.03 23M x 59.58 62.06 61.32 9P 4M x 4 58.03 62.06 61.32 P 4M x 4 60.81 8M x 2 58.03 66.081 8M x 2 58.03 66.03 60.03 6	R 0 epoc 28.11 27.86 33.11 0 epoc 29.76 36.21 10 epoc 34.05 33.87 37.37 e-traini A-19 ve 33.20 0 epoc 33.20 60 60 60 60 60 60 60 60 60 60 60 60 60	alid F _{0.5} hs pre-46.37 49.55 51.88 hs pre-151.88 hs pre-151.34 53.05 50.74 53.26 54.30 54.35 hs pre-151.76 53.20 54.35 hs pre-151.76 55.26 55.31 hs pre-151.76 55.28 50.48 55.29 70 55.71 hs pre-151.76 55.28 50.48 55.29 55.29 ft.	raining 67.98 73.36 73.36 73.36 69.89 training 69.89 training 69.89 training 69.89 70.42 73.44 70.11 -trainin -	CONLL-1 R 32.29 31.25 + fine- 35.59 + fine- 35.59 45.66 g + fine- 35.53 38.84 47.07 g + fine- 39.28 39.41 48.55 step + conucl- conucl	4 F _{0.5} [suning 55.64 57.78 62.67 tuning 55.64 62.67 tuning 58.59 60.81 63.86 -tuning 60.55 62.33 63.86 64.43 fine-tuning 59.60 fine-tuning 59.60 63.75 tuning 63.70 tuning 63.70 tuning 63.70 tuning 63.75	P 59.17 64.30 63.72 60.33 64.34 62.80 60.30 63.18 62.64 62.64 62.74 64.13 62.74 60.82 60.82 60.82 60.82 60.82 60.82 60.82 60.83 61.81 62.80	32.21 32.47 33.59 33.94 34.18 36.40 37.61 38.10 39.17 36.82 37.13 37.55 38.93 36.16 36.69	F _{0.5} 5 50.61 53.76 54.03 52.17 54.69 54.85 53.80 55.83 55.94 56.34 1 JFL F _{0.5} 53.93 56.59 53.81 55.93 55.93 55.93 55.93 55.93 55.93 55.93 55.93	57.69 58.10 61.03 58.78 59.28 61.81 60.07 60.68 62.59 60.46 60.85 62.99 60.13 60.19 60.13 60.54
ensemble ensemble + rescore single ensemble + rescore	P 4M x 1 57.85 60.45 55.50 61.53 60.45 57.85 62.78 8M x 1 57.85 62.78 62.02 60.82 32M x 58.25 62.06 61.32 pr BE P 4M x 2 58.03 61.46 60.81 8M x 2 58.17 61.73 60.69	R 0 epoc 28.11 27.86 29.76 33.11 0 epoc 29.76 36.21 10 epoc 33.53 38.00 34.03 38.00 34.05 33.87 8 e-traini A-19 vz R 0 epoc 33.64 33.36 33.30	alid F _{0.5} hs pre-h46.37 49.55 1.88 hs pre-h48.59 151.34 53.05 chs pre-50.74 553.26 54.30 chs pre-h51.76 553.20 54.35 hs pre-h50.74 550.74 550.74 754.24	raining 67.98 73.36 73.36 73.49 74.31 70.92 -training 74.31 70.11 -training 72.66 76.14 70.18 fixed # 73.39 73.39 71.35 70.26 raining 71.35 70.26 71.35 71.25	CONLL-1 R 32.29 31.25 + fine- 35.59 + fine- 35.59 45.66 g + fine- 38.85 47.07 g + fine- 38.85 + fine- 37.93 39.28 39.41 48.55 Estep + fine- 37.67 37.93 47.67 37.93 48.60 47.25	4 F _{0.5} [5.64] 57.78 (2.67) 58.79 (2.68) 60.81 (63.86) 60.55 (62.33) 63.86 (2.67) 64.18 (64.43) 64.43 (64.43) 65.69 (61.83) 67.60 (61.83) 67.60 (61.83) 67.60 (60.55) 68.70 (60.75) 68	P 59.17 64.30 63.72 60.33 64.34 62.80 60.30 63.18 62.64 62.47 64.13 62.74 ing P 60.82 64.43 63.82 63.82 64.83 63.82 63.82	R 32.21 32.47 33.59 33.94 34.18 36.40 37.61 38.10 39.17 36.82 40.01 FCE tes R 37.13 37.55 38.93	F _{0.5} 5 50.61 53.76 54.03 52.17 54.69 54.85 53.80 55.83 55.94 56.34 1 JFL F _{0.5} 53.93 56.59 53.81 55.93 55.93 55.93 55.93 55.93 55.93 55.93 55.93	57.69 58.10 61.03 58.78 59.28 61.81 60.07 60.68 62.59 60.46 60.85 62.99 EG test GLEU 59.71 60.19 61.92
ensemble ensemble + rescore single ensemble ensemble ensemble ensemble ensemble ensemble ensemble ensemble + rescore single ensemble + rescore single ensemble + rescore single ensemble ens	P 4M x 1 55.50 61.53 60.45 55.50 61.53 60.45 57.85 62.78 8M x 1 57.85 62.02 60.03 32M x 59.26 61.32 PF BE P 4M x 4 58.85 62.86 60.81	A-19 va R 0 epoc 28.11 27.86 0 epoc 28.11 30 epoc 29.76 33.11 0 epoc 33.53 34.03 34.03 33.87 37.37 e-traini 0 epoc 33.36 36.21 0 epoc 33.36 33.36 33.36 33.36 33.36 33.36 33.36 33.36 33.36 33.36 33.36 33.69 10 epoc 33.36	alid F _{0.5} hs pre-146.37 49.55 1.88 hs pre-148.59 1.34 53.05 chs pre-150.74 55.26 54.30 chs pre-150.74 fs. 55.26 55.27 45.29 75 55.24 45 55.29 75 55.24 45 chs pre-150.74 55.24 65.24	Training 67.98 73.36 73.36 73.49 rraining 69.89 70.92 -trainin 70.42 -trainin 70.42 -trainin 70.42 -trainin 70.43 70.11 -trainin 72.66 76.14 70.18 fixed # Company 72.66 76.19 70.26 71.35 76.15 76.15 76.15 76.15	CONLL-1 R 14.95 + fine- 32.29 31.25 + fine- 35.59 34.5.66 g + fine- 38.85 38.84 47.07 g + fine- 38.70 39.41 48.55 **step + CONLL-1 R + fine- 37.93 46.39 38.60 38.60 38.60 38.60 47.25 g + fine- 38.02	4 F _{0.5} Luning 55.64 62.67 (2.38 63.86 -tuning 60.55 62.07 64.18 64.43 fine-tun 4 F _{0.5} Luning 60.55 9.60 (61.83 63.70 64.18 63.70 64.66 65.67 63.75 64.66 65.67 63.75 64.66 65.67 63.75 64.66 65.67 63.68 65.67 63.75 64.66 65.67 63.75 64.66 65.67 63.75 64.66 65.67 63.75 64.66 65.67 63.75 64.66 65.67 63.75 64.66 65.67 63.75 64.66 65.67 63.75 64.66 65.67 63.75 64.66 65.67 65.67 64.66 65.67 64.66 65.67 64.66 65.67 64.66 65.67 64.66 65.67 65.67 64.66 65.67 64.66 65.67 64.66 65.67 64.66 65.67 64.66 65.67 64.66 65.67 64.66 65.67 64.66 65.67 64.66 65.67 64.66 65.67 65.67 64.66 65.67 64.66 65.67 64.66 65.67 64.66 65.67 64.66 65.67 65.67 64.66 65.67 64.66 65.67 64.66 65.67 64.66 65.67 64.66 65.67 64.66 65.67 64.66 65.67 64.67	P 59.17 64.30 63.72 60.33 64.34 62.80 60.30 62.64 62.47 62.74 iing P 60.82 64.43 63.82 64.43 63.82 64.59 63.12	32.21 32.47 33.59 33.94 34.18 36.40 37.61 38.10 39.17 36.82 36.91 40.01 FCE tes R 37.55 38.93 36.66 36.69 38.76	F _{0.5} 50.61 53.76 54.03 52.17 54.69 54.85 53.80 55.83 55.94 t JFL F _{0.5} 53.93 56.36 56.36 56.36 56.59	57.69 58.10 61.03 58.78 59.28 61.81 60.07 60.68 62.59 60.46 60.85 62.99 EG test GLEU 59.71 60.19 61.92 60.13 60.54 62.72
ensemble ensemble + rescore single ensemble + rescore single ensemble + rescore single ensemble + rescore single ensemble ensemble ensemble + rescore single ensemble + rescore single ensemble + rescore single ensemble + rescore single ensemble + rescore	P 44M x 4 558.25 62.08 P 761.73 60.49 60.81 8 8 M x 3 60.81 60.82 60.81 60.81 60.81 60.81 60.81 60.81 60.81 60.81 60.81 60.81 60.81 60.81 60.82 60.81 60.81 60.82 60.81 60.81 60.82 60.81 60.82 60.82 60.81 60.82 60.82 60.81	A-19 va R 0 epoc 28.11 27.86 0 epoc 28.11 30.epoc 29.76 29.76 29.76 29.76 33.53 36.21 10 epoc 33.53 38.00 10 epoc 34.05 R 10 epoc 33.53 R 10 epoc 33.53 8.00 10 epoc 33.55	alid F _{0.5} hs pre-146.37 49.55 51.58 hs pre-155.26 53.26 54.30 with halid F _{0.5} hs pre-155.26 53.27 hs pre-155.26 53.20 54.35 with halid F _{0.5} hs pre-155.26 53.27	raining 67.98 73.36 73.36 73.36 73.37 74.31 70.92 -training 70.42 73.44 70.11 -tr2.66 76.14 70.18 fixed # C P training 69.89 70.26 training 71.35 76.15 71.22 -trainit	CONLL-1 R 32.29 31.25 + fine- 35.59 + fine- 35.59 45.66 g + fine- 35.63 38.84 47.07 g + fine- 37.67 39.28 46.39 + fine- 37.67 37.67 346.39 + fine- 38.60 47.25 g 38.86	4 F _{0.5} [5.64 57.78 62.67 tuning 55.649 60.81 63.86 60.55 62.07 64.18 64.43 63.86 64.43 63.86 64.43 63.86 64.43 64.66 65.55 62.33 63.86 64.43 65.86 66.55 62.33 63.86 64.43 66.67 66.67 66.67 66.67 66.67 66.67 66.67 66.67 66.67 66.67 66.67 66.67 66.67 66.67 66.67 66.55	P 59.17 64.30 63.72 60.33 64.34 62.80 60.30 62.64 62.64 62.74 64.13 62.74 64.43 63.82 61.31 64.59 63.12	32.21 32.47 33.59 33.94 34.18 36.40 37.61 38.10 39.17 36.82 37.13 37.55 38.93 36.16 36.69 37.61 37.61	F _{0.5} 50.61 53.76 54.03 52.17 54.69 54.85 55.89 55.94 56.34 55.89 56.34 56.59 53.80 55.94 56.34 56.36 56.37 53.80 55.89 56.34 56.36 56.59	57.69 58.10 61.03 58.78 59.28 61.81 60.07 60.68 62.59 60.46 60.85 62.99 EG test GLEU 59.71 60.19 61.92 60.13 60.54 62.72
ensemble ensemble + rescore single ensemble + rescore single ensemble ensemble ensemble ensemble ensemble ensemble + rescore single ensemble + rescore single ensemble + rescore single ensemble ensemble + rescore single ensemble	P 4M x 1 55.50 61.53 60.45 62.78 60.03 32M x 59.58 62.06 61.32 9r 4M x 2 58.05 61.32 9r 60.81 8M x 3 60.69 61.32 61.66 61.66 61.32 61.66 61.32 61.66 61.32 61.66 61.32 61.66 61.66 61.66 61.66 61.66 61.66 61.66 6	A-19 va R 0 epoc 28.11 27.86 0 epoc 28.11 30 epoc 29.76 33.11 0 epoc 33.53 34.03 34.03 33.87 37.37 e-traini 0 epoc 33.36 36.21 0 epoc 33.36 33.36 33.36 33.36 33.36 33.36 33.36 33.36 33.36 33.36 33.36 33.69 10 epoc 33.36	alid F _{0.5} hs pre-hs p	raining 67.98 73.46 77.49 raining 69.89 74.31 70.92 -trainin 70.42 73.44 70.11 -training 69.89 73.39 71.35 70.26 raining 69.89 71.35 70.26 raining 71.35 70.26 raining 71.35 70.26 raining 71.35 70.26 raining 71.35 70.26	CONLL-1 R 32.29 31.25 + fine- 35.59 + fine- 35.59 45.66 g + fine- 38.55 47.07 g + fine- 38.85 48.55 Estep + CONLL-1 R R 37.93 - fine- 37.93 - fine- 37.93 - fine- 38.02 - fine- 38.03 -	4 F _{0.5} [P 59.17 64.30 63.72 60.33 64.34 62.80 60.30 63.18 62.64 62.47 64.13 62.74 ing P 60.82 64.43 63.82 64.59 63.12 60.30 63.13 63.13	R 32.21 32.47 33.59 33.94 34.18 36.40 37.61 38.10 39.17 36.82 36.91 40.01 FCE tes R 37.13 37.55 38.93 36.16 38.93 37.61 38.76	F _{0.5} 50.61 53.76 54.03 52.17 54.69 54.85 53.80 55.83 55.94 t JFL F _{0.5} 53.93 56.36 56.36 56.36 56.59	57.69 58.10 61.03 58.78 59.28 61.81 60.07 60.68 62.59 60.46 60.85 62.99 60.46 60.85 62.99 60.13 60.54 60.72 60.72 60.76
ensemble ensemble + rescore single ensemble + rescore single ensemble + rescore single ensemble + rescore single ensemble ensemble ensemble + rescore single ensemble + rescore single ensemble + rescore single ensemble + rescore single ensemble + rescore	P 4M x 1 57.85 60.45 57.85 60.78 8M x 1 57.85 62.78 60.03 16M x 58.25 62.02 60.82 32M x 50.86 61.32 9M x 2 58.17 61.73 8M x 2 58.17 61.73 61.73 61.73 61.73 61.73 62.02 60.82 60.82	R 0 epoc 28.11 27.86 0 epoc 28.11 0 epoc 29.76 33.11 0 epoc 39.76 10 epo 33.53 38.00 0 epoc 33.63 10 epoc 33.63 38.00 0 epoc 33.64 33.737 e-traini A-19 va R 0 epoc 33.64 33.73 0 epoc 33.64 33.73 10 epoc 33.64 33.73 38.05	alid F _{0.5} hs pre-146.37 49.55 1.88 hs pre-148.59 15.34 53.05 chs pre-50.74 55.26 54.30 chs pre-150.74 55.27 65.26 55.2	raining 67.98 73.46 77.49 raining 69.89 74.31 70.92 -trainin 70.42 73.44 70.11 -training 69.89 73.39 71.35 70.26 raining 69.89 71.35 70.26 raining 71.35 70.26 raining 71.35 70.26 raining 71.35 70.26 raining 71.35 70.26	CONLL-1 R 32.29 31.25 + fine- 35.59 + fine- 35.59 34.5.66 g + fine- 38.85 39.41 48.55 Estep +- CONLL-1 R	4 F _{0.5} Luning 55.64 57.78 60.81 60.81 60.81 60.81 60.83 63.86 62.07 64.18 64.43 63.06 61.83 61.85 61	P 59.17 64.30 63.72 60.33 64.34 62.80 60.30 63.18 62.64 62.47 64.13 62.74 ing P 60.82 64.43 63.82 64.59 63.12 60.30 63.13 63.13	R 32.21 32.47 33.59 33.94 34.18 36.40 37.61 38.10 39.17 36.82 36.91 40.01 FCE tes R 37.13 37.55 38.93 36.16 38.93 37.61 38.76	F _{0.5} F _{0.5} S _{0.61} S _{0.61} S _{0.61} S _{0.61} S _{0.61} S _{0.61} S _{0.62}	57.69 58.10 61.03 58.78 59.28 61.81 60.07 60.68 62.59 60.46 60.85 62.99 EG test GLEU 59.71 60.19 61.92 60.13 60.54 62.72
ensemble ensemble + rescore single ensemble + rescore single ensemble ensemble ensemble ensemble ensemble + rescore single ensemble + rescore single ensemble + rescore single ensemble single ensemble ensemble single ensemble ensemble single ensemble ensemble single	P 4M x 1 60.45 60.45 60.27 8M x 1 58.25 62.02 32M x 59.58 62.06 61.32 pr 4M x 2 58.03 60.81 75 60.69 16M x 58.25 62.02 60.82 75 8M x 1 75 60.82 75 75 75 75 75 75 75 75 75 75 75 75 75	R 0 epoc 28.11 27.86 29.76 33.11 0 epoc 29.76 36.21 10 epoc 33.403 33.87 37.37 e-traini A-19 ve R R R R R R R R R R R R R R R R R R R	alid $F_{0.5}$ hs pre-h46.377 49.55 51.88 hs pre-h48.59 51.34 53.05 chs pre-50.74 553.26 54.30 chs pre-h50.48 55.260 54.35 hs pre-h50.48 52.60 fs pre-50.74 55.371 hs pre-h50.48 52.60 fs pre-h50.48 52.60 fs pre-h50.48 fs pre-h50.49 fs pre-h	raining 67.98 73.46 73.47 74.31 70.92 -training 74.31 70.92 -training 69.89 73.39 73.44 70.11 -training 69.89 73.39 71.35 70.26 raining 71.35 70.26 71.35 71.22 -training 71.35 70.26 70.26 -training 71.35 70.26 73.39 73.39 73.39 73.39 73.39 73.39 73.39 73.39 73.30	ONLL-1 R 32.29 31.25 + fine- 32.29 31.25 + fine- 35.59 4 fine- 35.59 345.66 g + fine- 38.84 47.07 g 39.28 39.41 48.55	4 F _{0.5} [5.64] 57.78 [55.64] 57.78 [58.59] 58.59 [60.81] 63.86 [60.55 [60.55 [60.57 [64.18 [64.43] 64.43 [64.43 [64.43 [65.70 [66.75 [64.66 [66.75 [64.66 [66.75 [64.66 [66.75 [6	P 59.17 64.30 63.72 60.33 64.34 62.80 60.30 62.64 62.64 62.74 60.82 61.31 64.59 63.18 62.64 60.30 63.18 62.64 60.82 60.82 60.82 60.80 60.81 60.80 60.80 60.81 60.80 60.8	R 32.21 32.47 33.59 33.94 34.18 36.40 37.61 38.10 39.17 36.82 40.01 FCE tes R 37.13 37.55 38.93 36.16 36.69 38.76 37.61 38.10 39.17	F _{0.5} F _{0.5} S _{0.61} S _{0.61} S _{0.61} S _{0.61} S _{0.61} S _{0.61} S _{0.62}	57.69 58.10 61.03 58.78 59.28 61.81 60.07 60.68 62.59 60.46 60.85 62.99 EG test GLEU 59.71 60.13 60.54 62.72 60.68 62.59 60.05
ensemble ensemble + rescore single ensemble + rescore single ensemble ensemble ensemble ensemble ensemble ensemble + rescore single ensemble + rescore single ensemble + rescore single ensemble ensemble + rescore single ensemble	P 4M x 1 57.85 60.45 57.85 60.78 8M x 1 57.85 62.78 60.03 16M x 58.25 62.02 60.82 32M x 50.86 61.32 9M x 2 58.17 61.73 60.81 8M x 2 58.17 61.73 60.81 60.81 32M x 58.25 8.90 62.66 60.82	R 0 epoc 28.11 0 epoc 29.76 33.11 0 epoc 29.76 30.621 10 epo 33.53 38.00 10 epoc 33.53 38.00 10 epoc 33.63 33.87 37.37 e-traini A-19 vz R 0 esoc 33.64 33.79 10 epoc 33.64 33.79 10 epoc 33.63 33.64 33.79 10 epoc 33.64 33.79 5 epoc 33.63 33.64 33.79 33.36 33.64 33.79 33.36 33.30 33.30 33.30	alid F _{0.5} hs pre-146.37 49.55 1.88 hs pre-148.59 15.34 53.05 chs pre-15.34 53.05 chs pre-15.34 53.05 chs pre-15.34 53.20 54.35 hs pre-15.34 53.20 54.35 hs pre-15.34 65.35 hs pre-15.35 hs pre-15.	Training 67.98 73.36 73.46 70.92 -training 70.42 -training 70.42 -training 70.42 70.11 -training 72.66 76.14 70.18 fixed # CP Training 71.35 76.15 76.15 76.15 76.15 76.17 70.42 -training 71.35 76.15 76.17 70.42 -training 71.35 76.15 76.17 70.42 -training 71.35 76.15 76.17 70.42 -training 70.42	ONLL-1 R 41.95 + fine- 32.29 31.25 + fine- 35.59 45.66 g + fine 38.85 38.84 47.07 g + fine 38.85 - 39.28 39.41 48.55	4 F _{0.5} tuning 55.64 62.87 tuning 60.55 6.84 62.33 63.86 62.07 64.18 63.86 63.86 62.07 64.18 63.86 60.15 62.68	P 59.17 64.30 63.72 60.33 64.34 62.80 63.18 62.64 62.47 64.13 63.82 64.43 63.82 64.43 63.82 64.43 63.82 64.64 64.64 64.64 65.64 66.81 66.80 66.8	32.21 32.47 33.59 33.94 34.18 36.40 37.61 38.10 39.17 36.82 36.91 40.01 FCE tes R 37.55 38.93 36.16 36.69 37.61 38.76 37.61 38.10 39.17	F _{0.5} F _{0.5} F _{0.5} F _{0.6} F ₀	57.69 58.10 61.03 58.78 59.28 61.81 60.07 60.68 62.59 60.46 60.85 62.99 EG test GLEU 59.71 60.19 61.92 60.13 60.54 62.72 60.05 60.68 62.59
ensemble ensemble + rescore single ensemble + rescore single ensemble ensemble ensemble ensemble ensemble + rescore single ensemble + rescore single ensemble + rescore single ensemble ensemble + rescore single ensemble ensemble + rescore single ensemble + rescore single ensemble + rescore single ensemble + rescore	P 4M x 1 57.85 60.45 57.85 60.78 8M x 1 57.85 62.78 60.03 16M x 58.25 62.02 60.82 32M x 50.86 61.32 9M x 2 58.17 61.73 60.81 8M x 2 58.17 61.73 60.81 60.81 32M x 58.25 8.90 62.66 60.82	R 0 epoc 28.11 0 epoc 29.76 33.11 0 epoc 29.76 30.621 10 epo 33.53 38.00 10 epoc 33.53 38.00 10 epoc 33.63 33.87 37.37 e-traini A-19 vz R 0 esoc 33.64 33.79 10 epoc 33.64 33.79 10 epoc 33.63 33.64 33.79 10 epoc 33.64 33.79 5 epoc 33.63 33.64 33.79 33.36 33.64 33.79 33.36 33.30 33.30 33.30	alid $F_{0.5}$ hs pre-h46.377 49.55 51.88 hs pre-h48.59 51.34 53.05 chs pre-50.74 553.26 54.30 chs pre-h50.48 55.260 54.35 hs pre-h50.48 52.60 fs pre-50.74 55.371 hs pre-h50.48 52.60 fs pre-h50.48 52.60 fs pre-h50.48 fs pre-h50.49 fs pre-h	Training 67.98 73.36 73.46 70.92 -training 70.42 -training 70.42 -training 70.42 70.11 -training 72.66 76.14 70.18 fixed # CP Training 71.35 76.15 76.15 76.15 76.15 76.17 70.42 -training 71.35 76.15 76.17 70.42 -training 71.35 76.15 76.17 70.42 -training 71.35 76.15 76.17 70.42 -training 70.42	ONLL-1 R 41.95 + fine- 32.29 31.25 + fine- 35.59 45.66 g + fine 38.85 38.84 47.07 g + fine 38.85 - 39.28 39.41 48.55	4 F _{0.5} [5.64] 57.78 [55.64] 57.78 [58.59] 58.59 [60.81] 63.86 [60.55 [60.55 [60.57 [64.18 [64.43] 64.43 [64.43 [64.43 [65.70 [66.75 [64.66 [66.75 [64.66 [66.75 [64.66 [66.75 [6	P 59.17 64.30 63.72 60.33 64.34 62.80 63.18 62.64 62.47 64.13 63.82 64.43 63.82 64.43 63.82 64.43 63.82 64.64 64.64 64.64 65.64 66.81 66.80 66.8	R 32.21 32.47 33.59 33.94 34.18 36.40 37.61 38.10 39.17 36.82 40.01 FCE tes R 37.13 37.55 38.93 36.16 36.69 38.76 37.61 38.10 39.17	F _{0.5} F _{0.5} F _{0.5} F _{0.6} F ₀	57.69 58.10 61.03 58.78 59.28 61.81 60.07 60.68 62.59 60.46 60.85 62.99 EG test GLEU 59.71 60.13 60.54 62.72 60.68 62.59 60.05

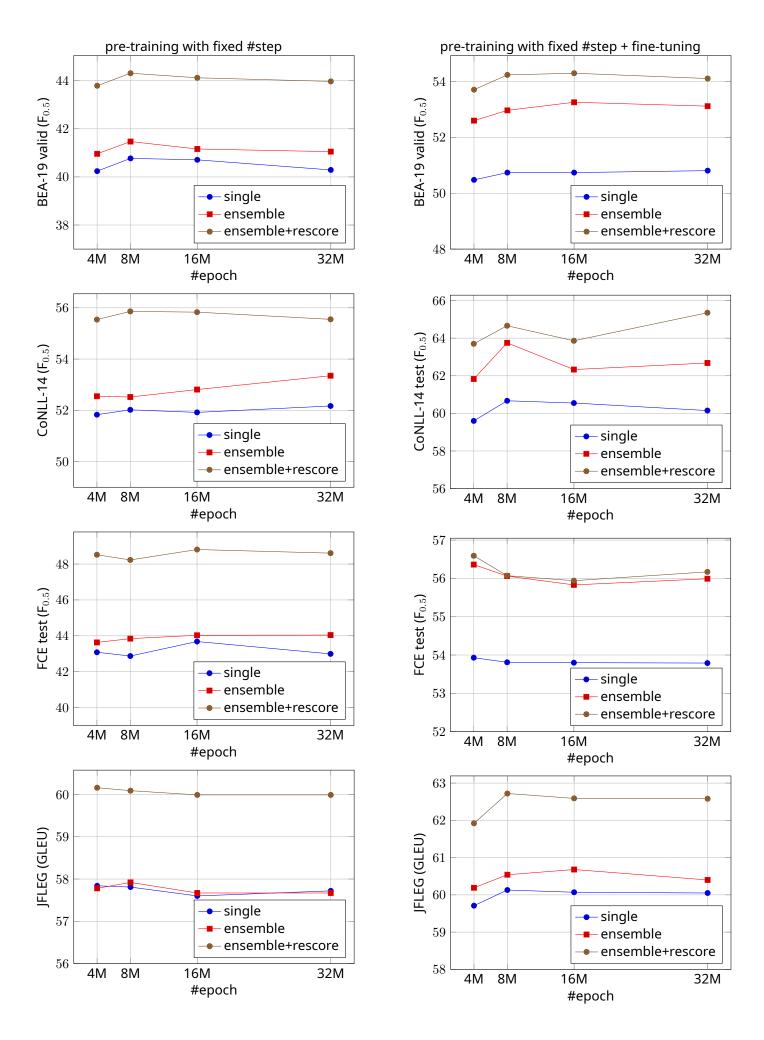
	baseline (varing BPE-dropout probability)										
	BE	A-19 va	lid		ONLL-1	4	FCE test JFLEG test				
	Р	R	F _{0.5}	Р	R	F _{0.5}	Р	R	F _{0.5}	GLEU	
	p = 0										
single	50.39	24.44	41.55	63.04	28.52	50.71	56.66	27.56	46.76	53.67	
ensemble	58.15	24.19	45.40	69.87	27.94	53.74	62.90	27.76	50.19	54.50	
ensemble + rescore	56.92	29.81	48.16	68.09	37.59	58.58	62.01	30.82	51.57	57.90	
	p = 0	.05									
single	52.30	28.56	44.83	65.72	29.95	53.03	56.10	33.35	49.35	57.04	
ensemble	58.84	28.45	48.49	71.99	29.20	55.67	62.27	33.85	53.32	57.62	
ensemble + rescore	59.34	32.15	50.76	67.41	43.16	60.06	62.14	35.04	53.82	60.68	
	p = 0	.1									
single	52.13	28.54	44.73	66.35	30.82	53.88	58.56	31.46	49.91	57.37	
ensemble	58.37	28.47	48.24	72.24	30.17	56.49	63.68	31.61	52.94	58.02	
ensemble + rescore	59.15	33.23	51.17	70.27	41.59	61.75	63.78	34.38	54.47	61.04	
	p = 0	.15									
single	51.72	28.34	44.38	66.22	30.98	53.94	58.75	30.14	49.35	57.43	
ensemble	58.44	28.35	48.21	72.74	30.14	56.71	64.75	30.64	52.96	58.24	
ensemble + rescore	58.07	33.37	50.58	67.75	43.12	60.80	64.67	33.04	54.28	60.79	
	p = 0	.2									
single	51.45	28.04	44.09	64.67	31.50	53.41	57.06	31.39	49.01	57.53	
ensemble	57.71	27.84	47.51	71.80	30.58	56.56	63.06	31.90	52.75	58.16	
ensemble + rescore	57.91	33.12	50.37	66.93	42.42	59.99	61.28	35.70	53.60	61.05	

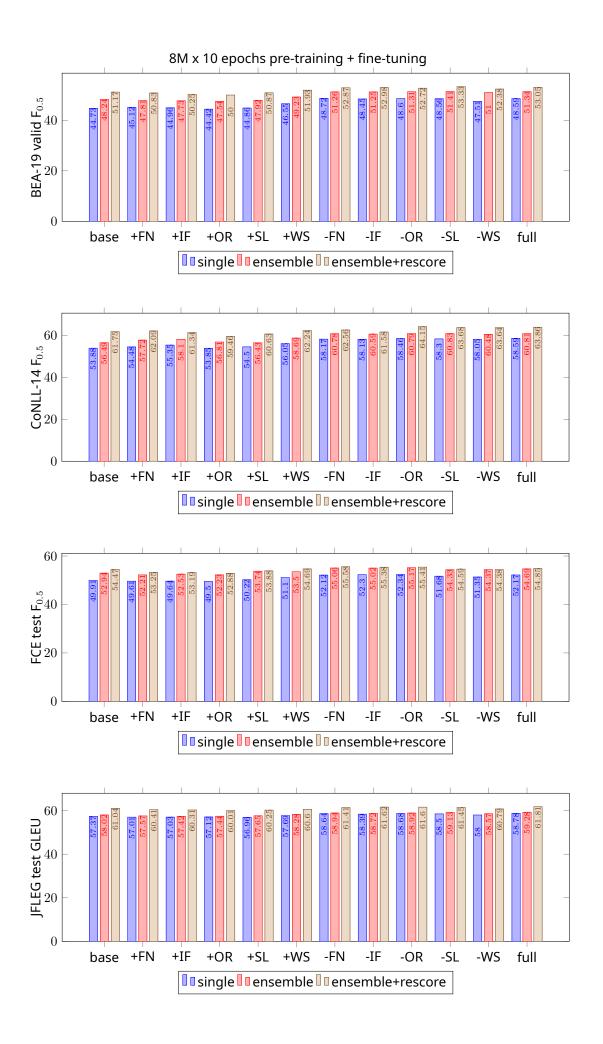
8M x 10 epochs pre-training (only 1 category) + fine-tuning											
	BE	A-19 va	ilid	C	oNLL-1	4		FCE tes	t JFL	JFLEG test	
	Р	R	F _{0.5}	Р	R	F _{0.5}		R	F _{0.5}	GLEU	
	8M x 1	0 epoc	hs pre-				tional word) + fine-tuning			ing	
single	54.21	27.11	45.12				58.83		49.61	57.01	
ensemble	59.42	26.83	47.81	74.61	30.03	57.52	63.49	30.51	52.21	57.57	
ensemble + rescore			50.83			62.09		33.68		60.41	
	8M x 1	0 epoc	hs pre-	training	(only fo	or infle	tion) +	fine-tur	ning		
single	53.83	27.14	44.96	68.74	31.16	55.35	58.77	30.70	49.64	57.03	
ensemble	59.51	26.63	47.73	74.42	30.95	58.10	63.81	30.78	52.53	57.42	
ensemble + rescore	58.49		50.25			61.34		33.11	53.19	60.31	
	8M x 1	0 epoc	hs pre-	training	(only fo	or word	order)	+ fine-t	uning		
single	52.76	27.28	44.42	67.52	29.79	53.85	58.92	30.31	49.50	57.12	
ensemble	58.72	26.98	47.54	74.59	29.07	56.81	63.69	30.38	52.23	57.44	
ensemble + rescore	57.80	32.48	50.00	66.24	42.18	59.46	63.57	31.61	52.88	60.01	
	8M x 1	0 epoc	hs pre-	training	(only fo	or word	selecti	on) + fir	ne-tunii	ng	
single	53.82	26.99	44.86	67.60	30.74	54.50	60.10	30.41	50.22	56.96	
ensemble	59.50	26.94	47.92	72.62	29.83	56.43	66.07	30.78	53.74	57.65	
ensemble + rescore	58.80	33.05	50.87	68.15	42.07	60.63	64.20	32.80	53.88	60.25	
	8M x 1	0 epoc	hs pre-	training	(only fo	or writii	ng syste	em) + fii	ne-tunii	ng	
single	55.99	27.90	46.55	69.49	31.62	56.05	59.90	32.28	51.10	57.69	
ensemble	61.19	27.64	49.23	75.38	31.13	58.69	63.88	32.42	53.50	58.28	
ensemble + rescore	60.30	33.39	51.93	70.96	41.73	62.24	63.88	34.71	54.69	60.60	

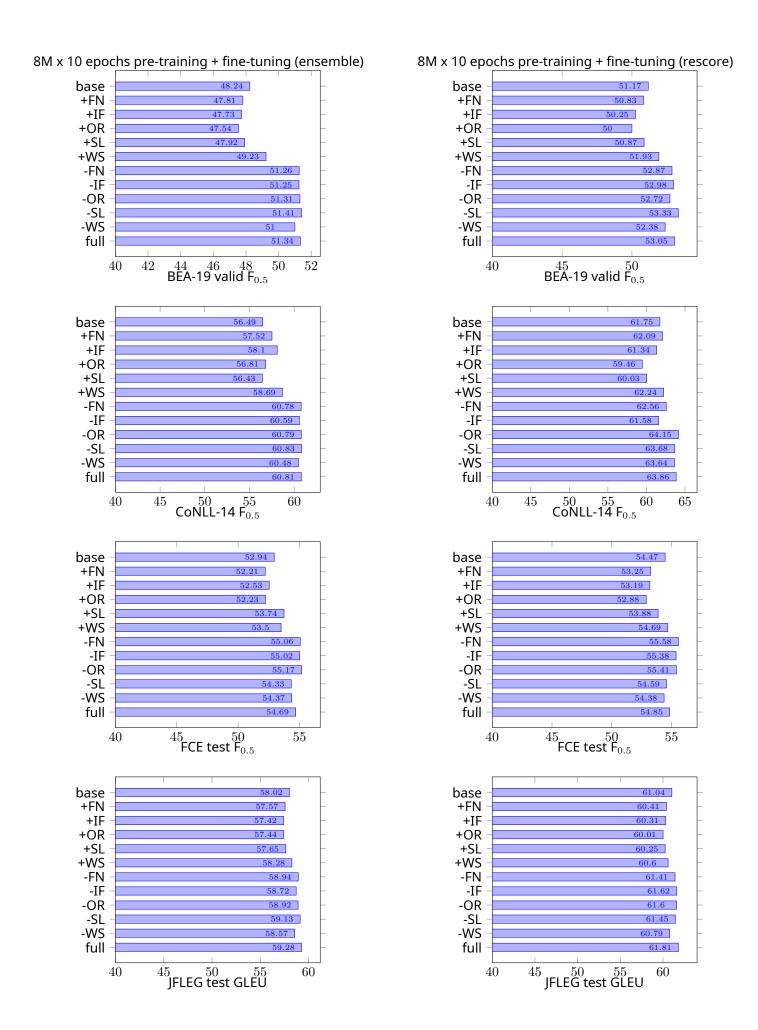
8M x 10 epochs pre-training (excluding 1 category) + fine-tuning											
	BE	A-19 va	ılid	C	ONLL-1	4	FCE test JF			EG test	
	Р	R	F _{0.5}	P	R	F _{0.5}	Р	R	F _{0.5}	GLEU	
	8M x 1	0 epoc	hs pre-			ling fur	nctional word) + fine-tuning				
single	56.25	31.77	48.72	70.15	34.60	58.17	59.92	34.36	52.12	58.64	
ensemble	60.72	31.59	51.26	74.69	34.83	60.78	64.48	34.75	55.06	58.94	
ensemble + rescore	58.95	37.42	52.87	69.13	45.34	62.56	64.36	35.96	55.58	61.41	
	8M x 10 epochs pre-training (excluding inflection) + fine-tuning										
single	56.97	30.37	48.45	70.46	34.24	58.13	59.99	34.59	52.30	58.39	
ensemble	61.65	30.61	51.25	76.17	33.33	60.59	64.46	34.69	55.02	58.72	
ensemble + rescore	59.36	37.05	52.98	67.21	46.14	61.58	64.18	35.77	55.38	61.62	
	8M x 1	0 epoc	hs pre-	training	(exclud	ling wo	rd orde	r) + fine	-tuning]	
single	56.83	30.79				58.46		34.75	52.34	58.68	
ensemble	61.55	30.81	51.31	75.18	34.44	60.79	64.31	35.17	55.17	58.92	
ensemble + rescore	61.13	34.00	52.72	73.13	43.03	64.15	63.84	36.25	55.41	61.60	
	8M x 1			training							
single	57.17	30.33	48.56	69.60	35.41	58.30	59.11	34.45	51.68	58.50	
ensemble	62.25	30.30	51.41	74.57	35.03	60.83	63.37	34.60	54.33	59.13	
ensemble + rescore	61.03	35.45	53.33	71.98	43.58	63.68	62.94	35.66	54.59	61.45	
	8M x 1	0 epoc	hs pre-	training	(exclud	ling wri	ting sys	stem) +	fine-tui	ning	
single	55.51	30.24	47.51		34.96	58.05	59.25	33.52		58.00	
ensemble	61.23	30.57	51.00	74.36	34.63	60.48	64.30	33.61	54.37	58.57	
ensemble + rescore	60.10	34.61	52.38	72.64	42.55	63.64	63.38	34.67	54.38	60.79	

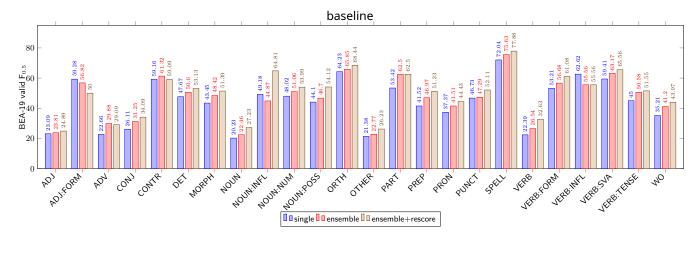


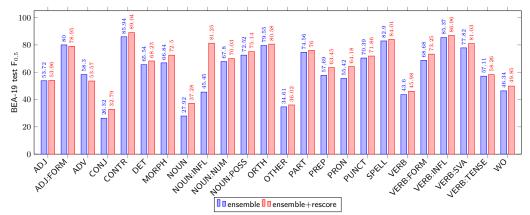


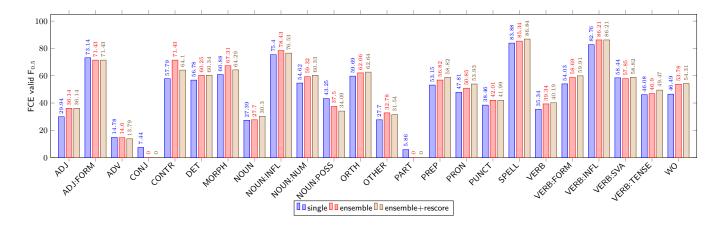


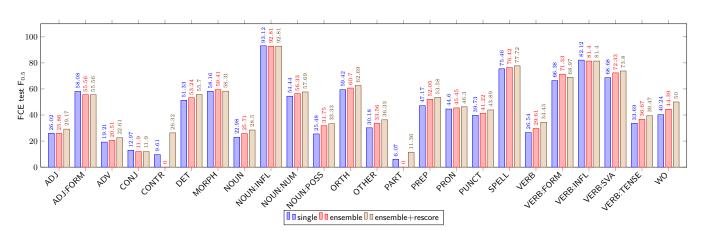


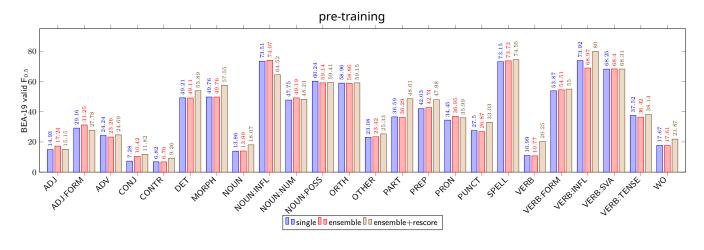


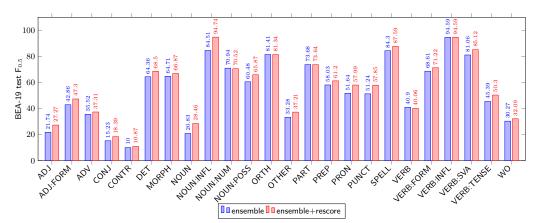


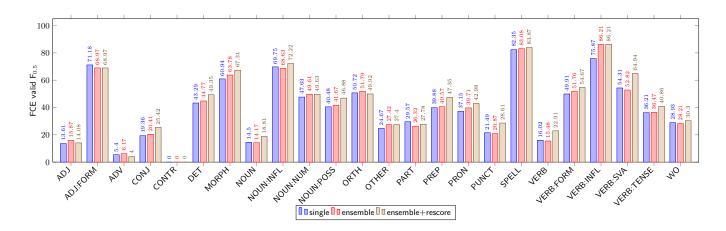


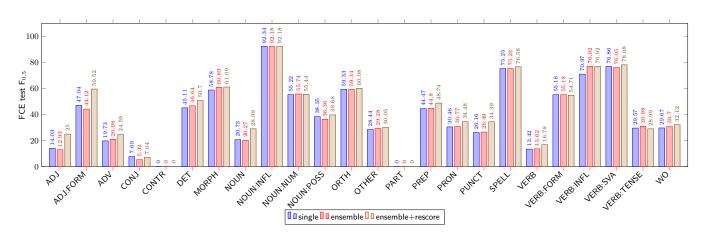


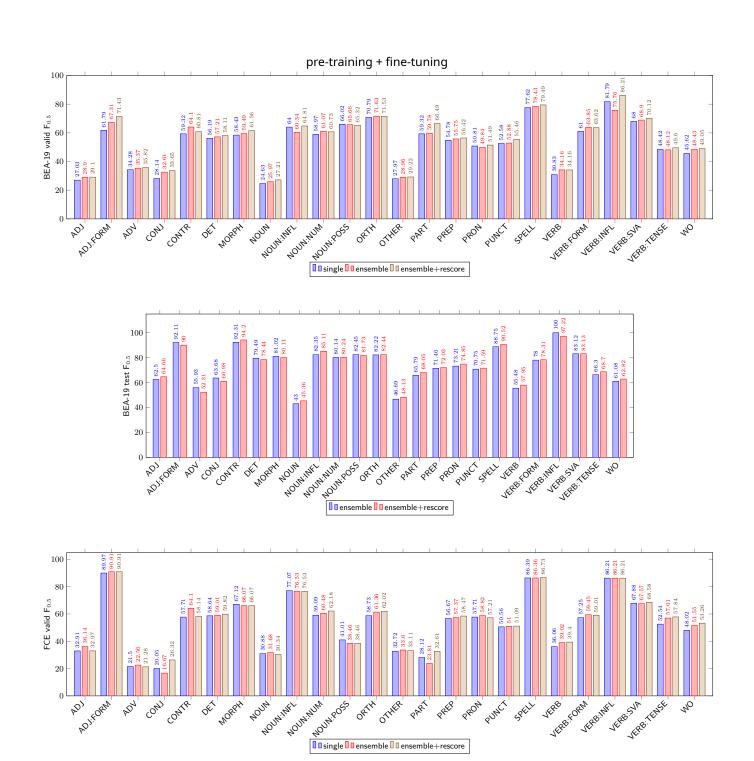


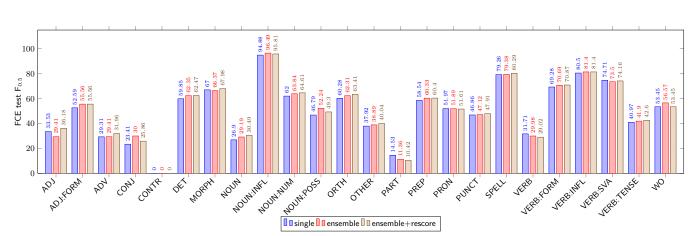


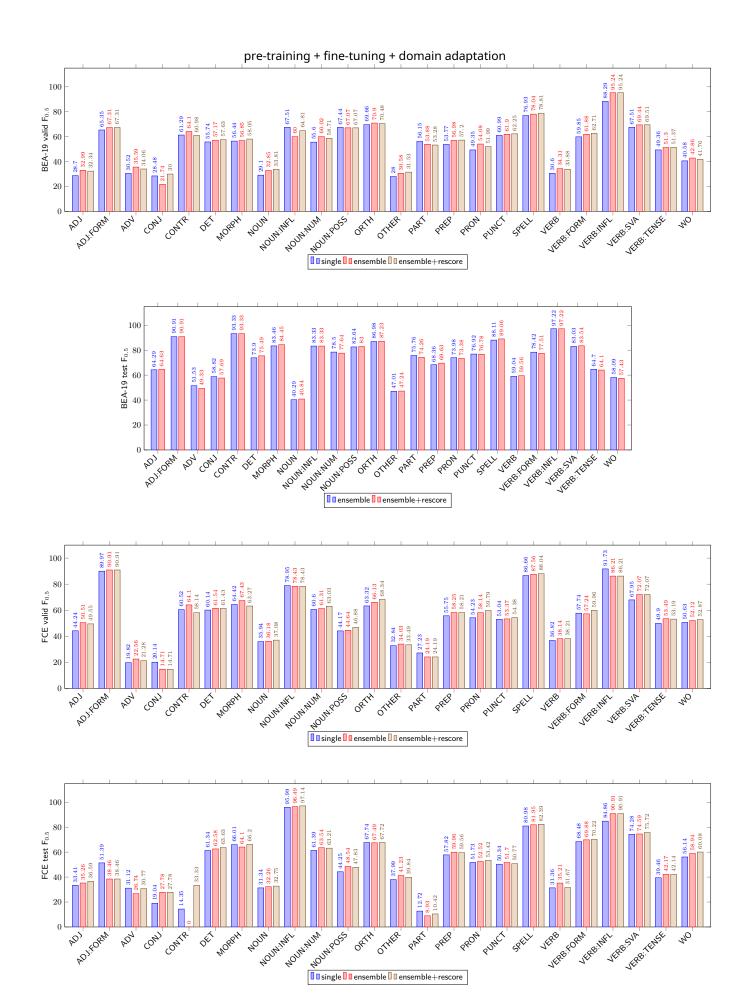


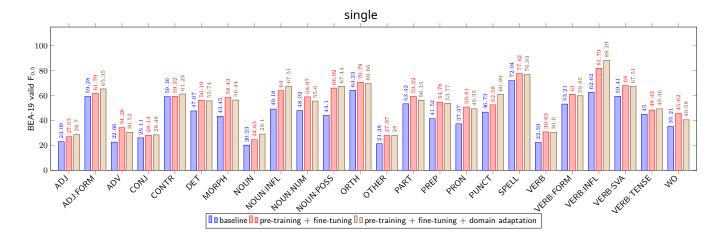


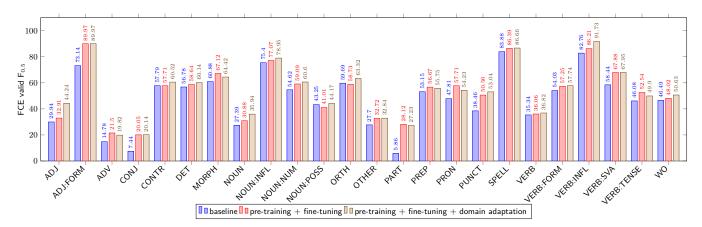


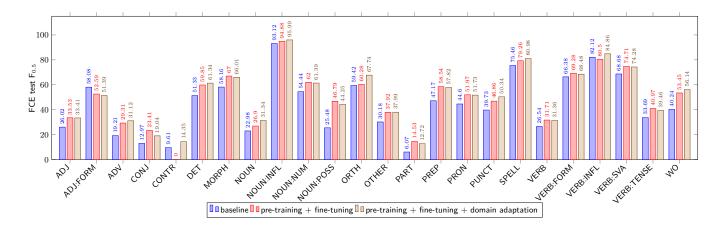


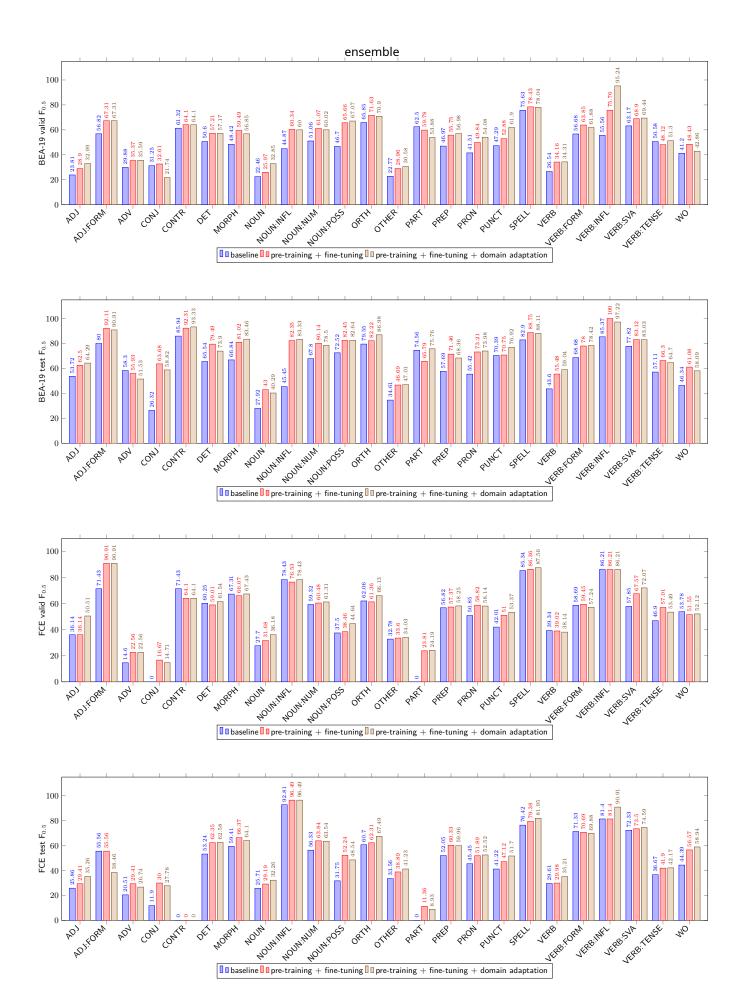


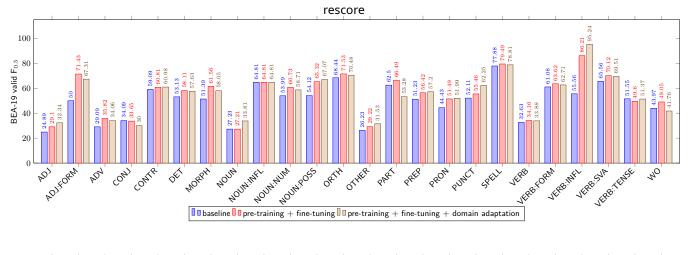


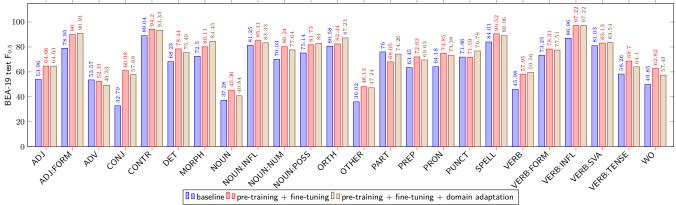


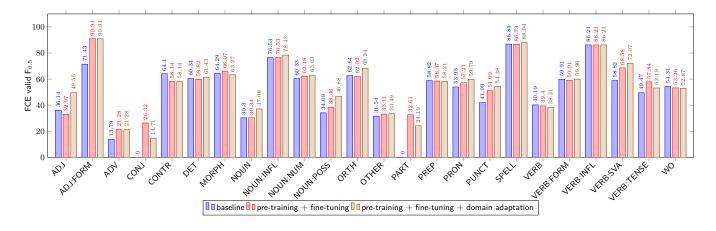


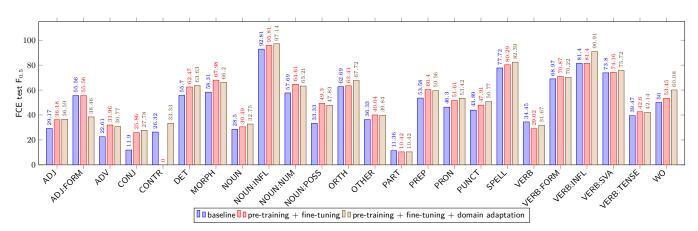


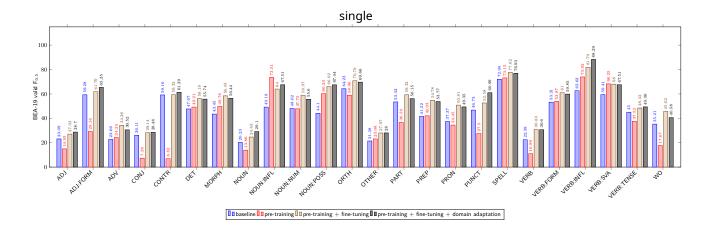


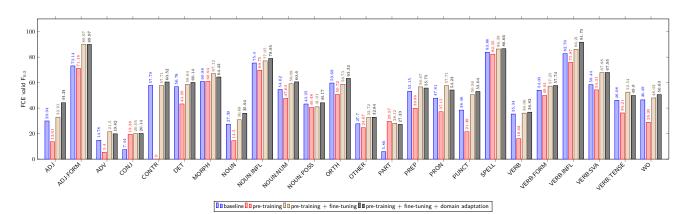


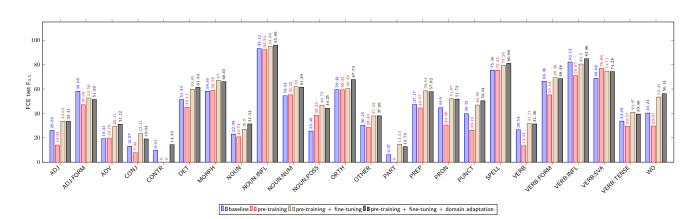


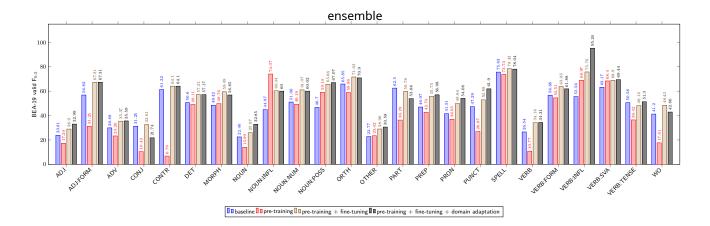


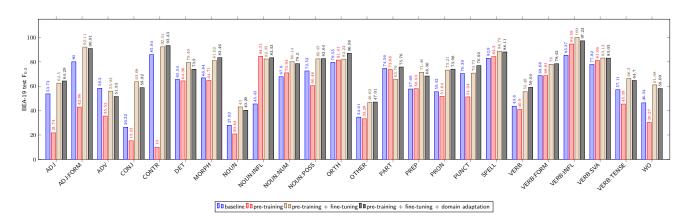


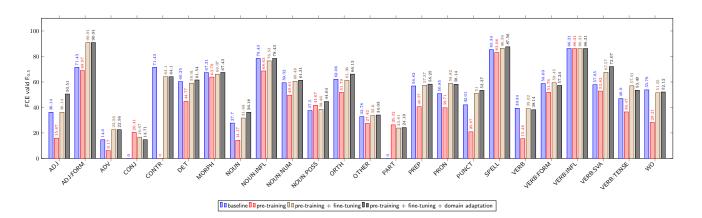


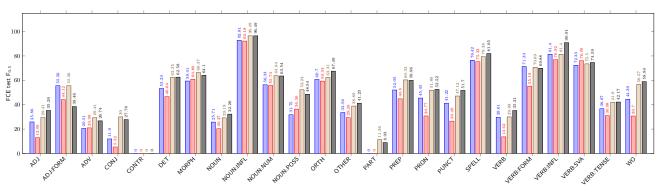




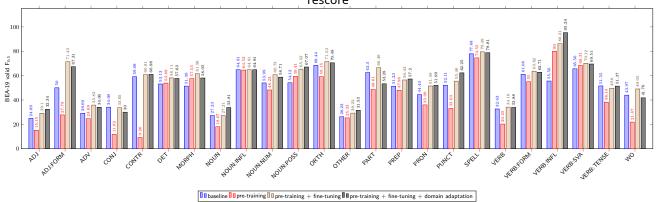


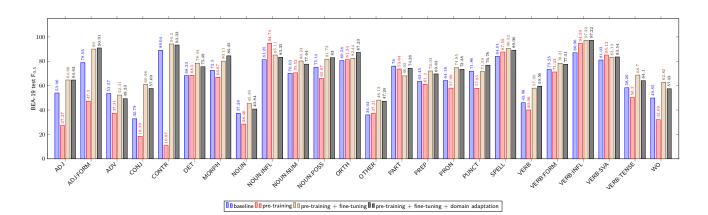


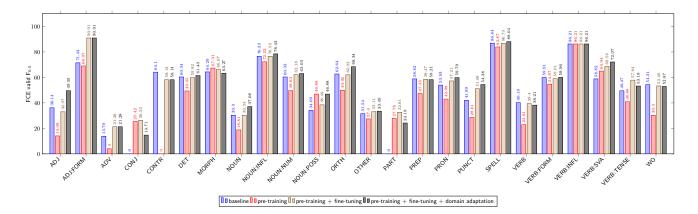


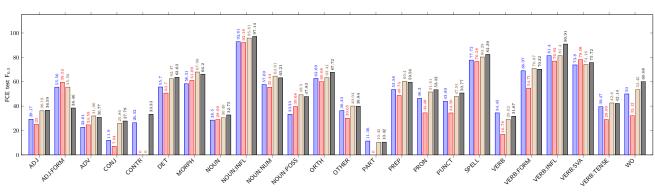


 $\fbox{\cite{this optimises} 0.0 pre-training 0.0 pre-training + fine-tuning 0.0 pre-training + fine-tuning + fine-tu$

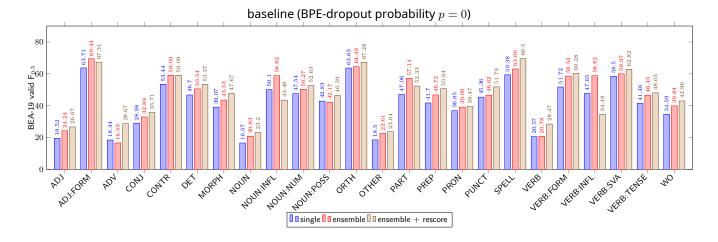


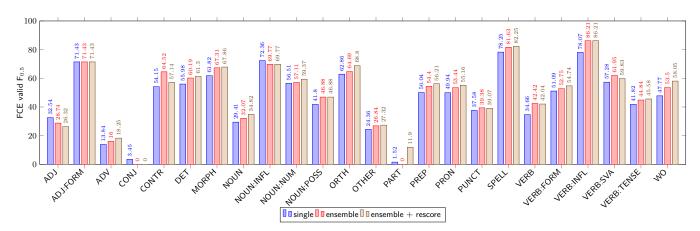


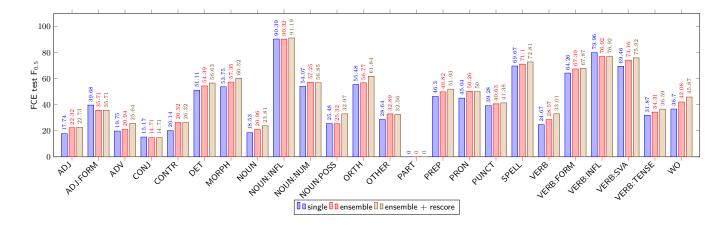


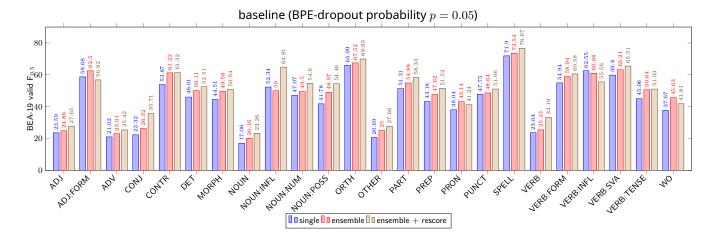


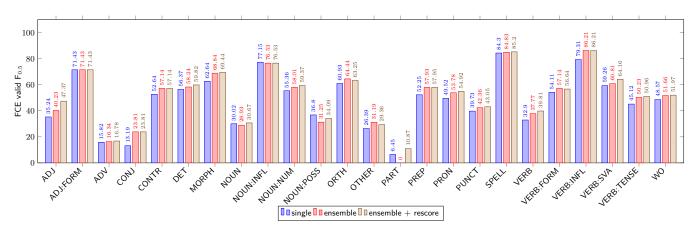
 $\fbox{\begin{tabular}{l} \blacksquare \ 0 \ \text{baseline} \ \blacksquare \ 0 \ \text{pre-training} \ \blacksquare \ 0 \ \text{pre-training} \ + \ \text{fine-tuning} \ \blacksquare \ 0 \ \text{pre-training} \ + \ \text{fine-tuning} \ + \ \text{fine-t$

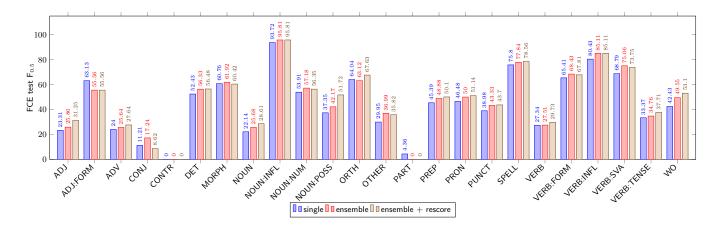


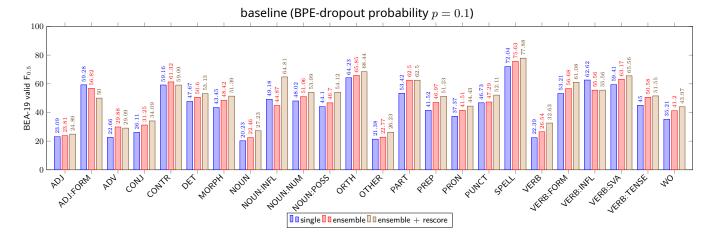


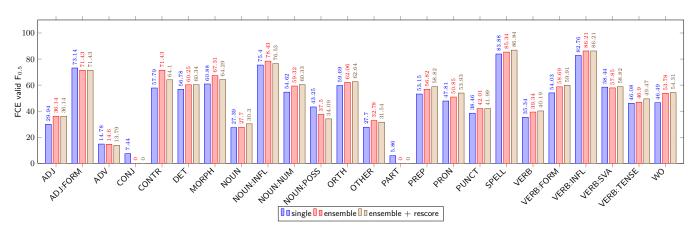


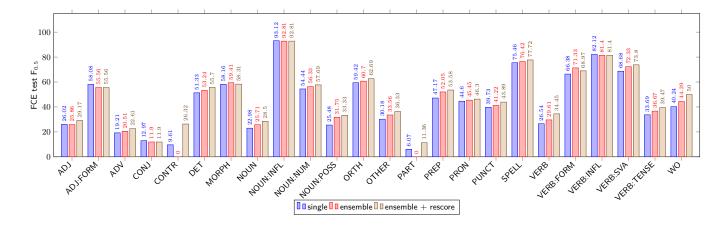


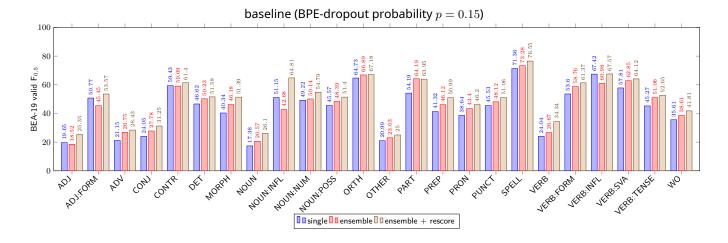


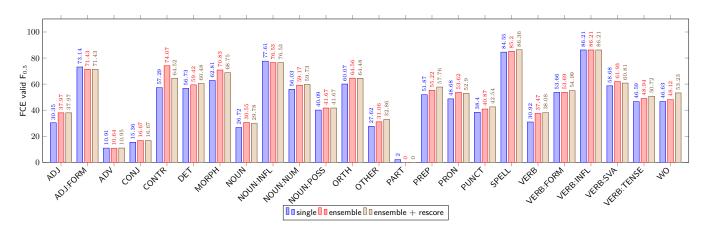


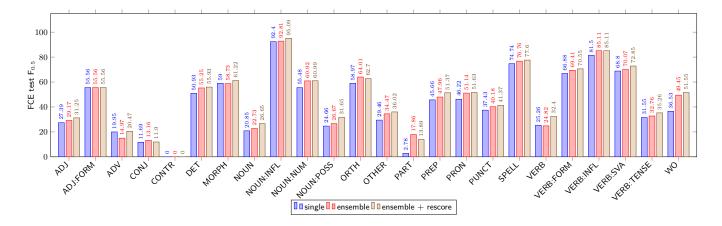


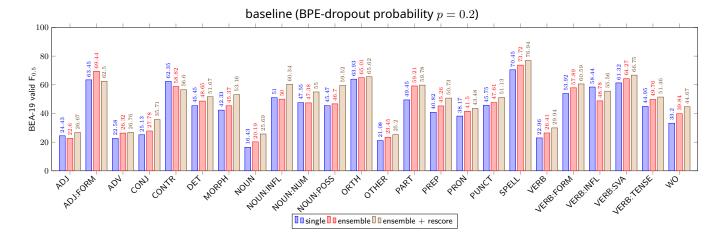


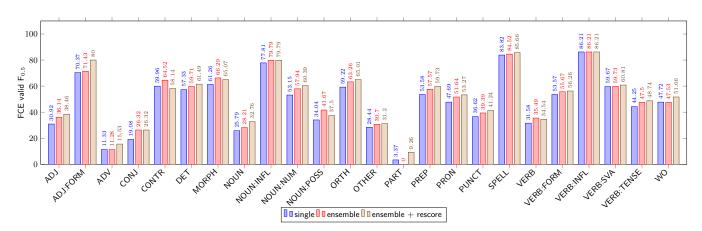


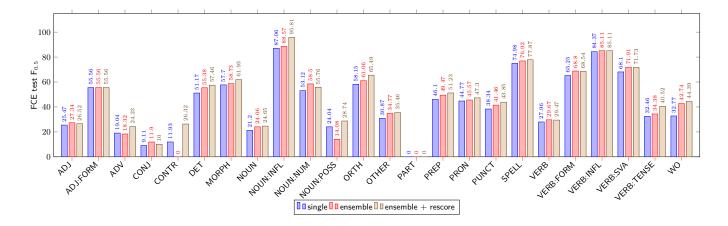


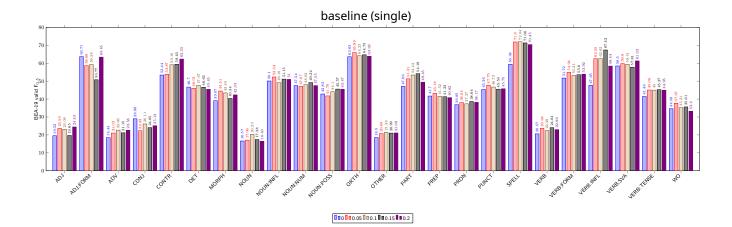


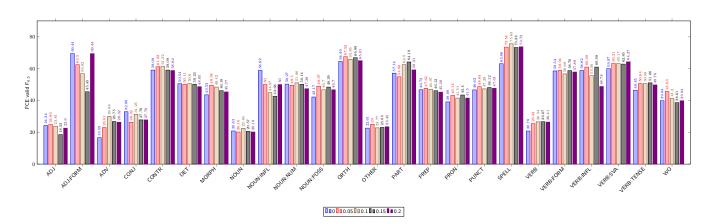


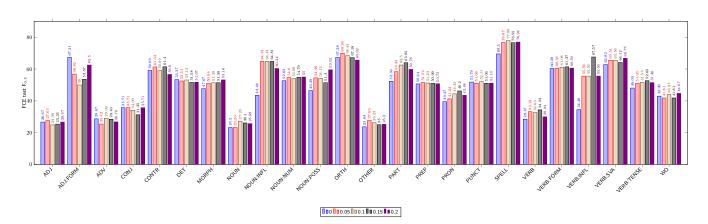


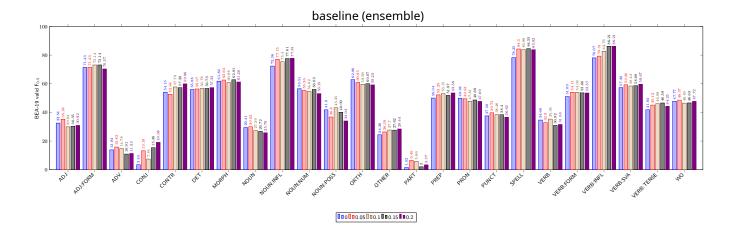


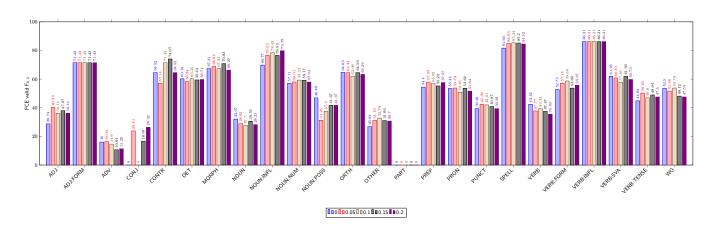


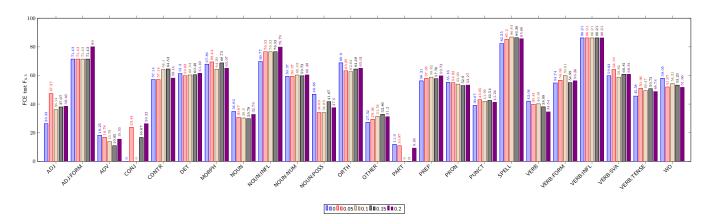


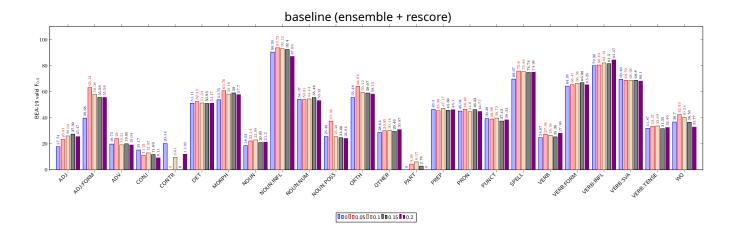


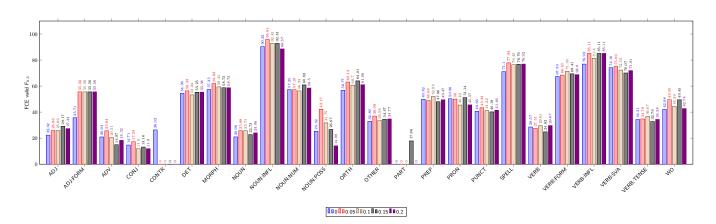


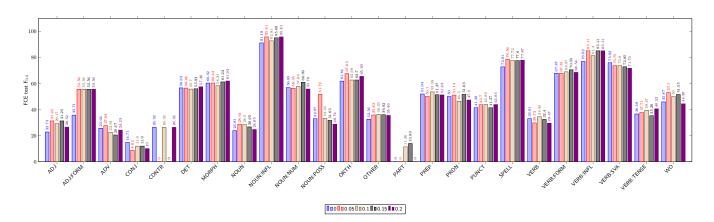


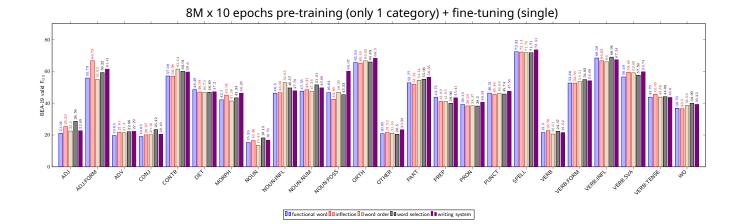


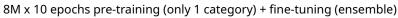


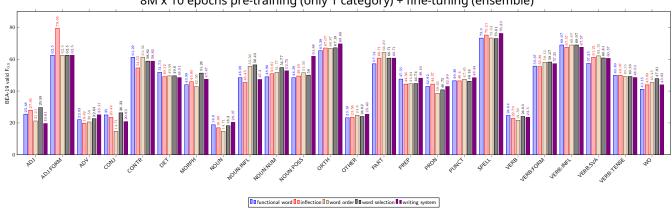




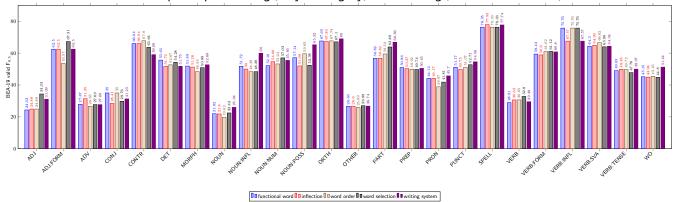




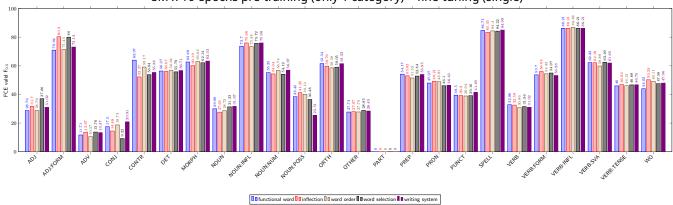




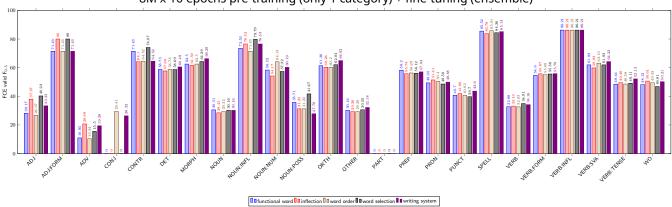




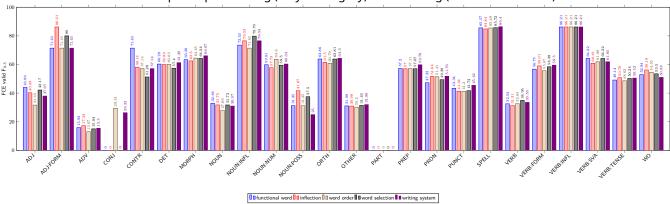
8M x 10 epochs pre-training (only 1 category) + fine-tuning (single)

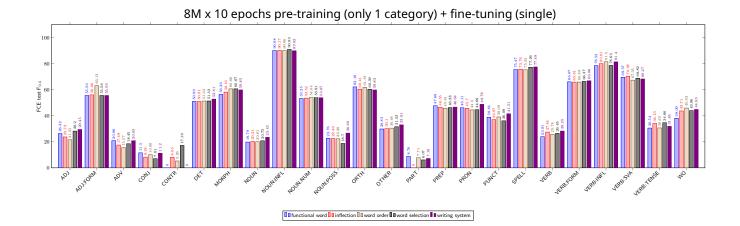


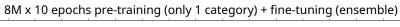
8M x 10 epochs pre-training (only 1 category) + fine-tuning (ensemble)

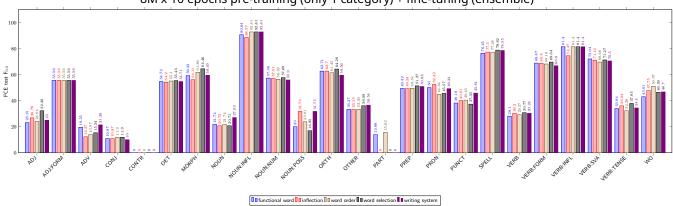


8M x 10 epochs pre-training (only 1 category) + fine-tuning (ensmble + rescore)

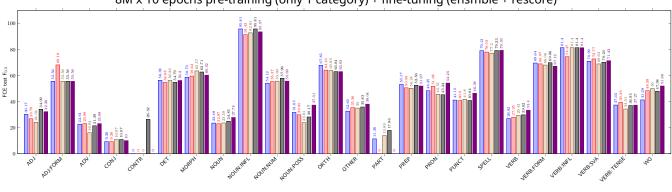




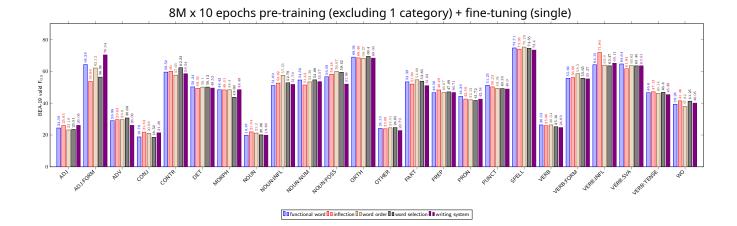


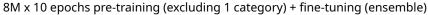


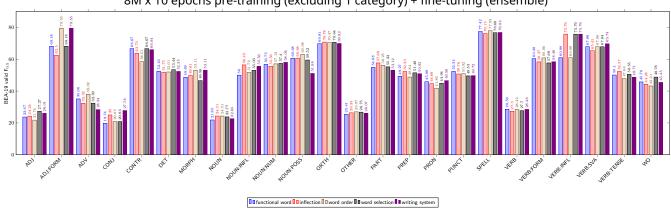


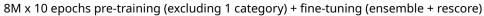


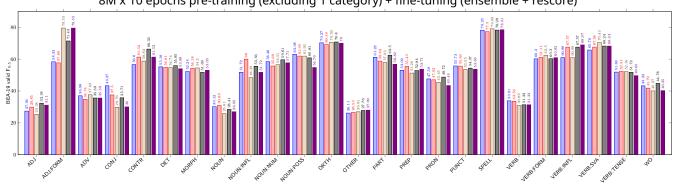
☐☐ functional word ☐☐ inflection ☐☐ word order ☐☐ word selection ☐☐ writing system



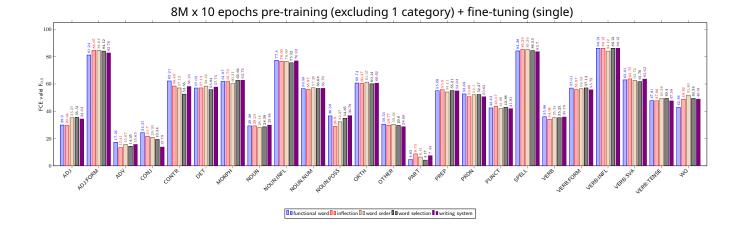


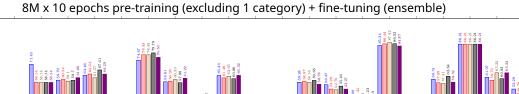


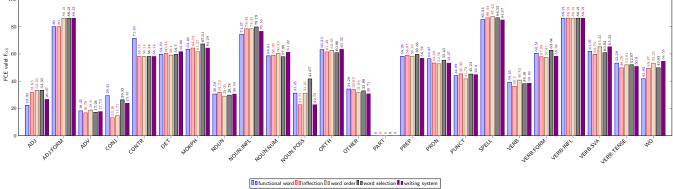


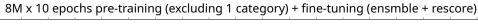


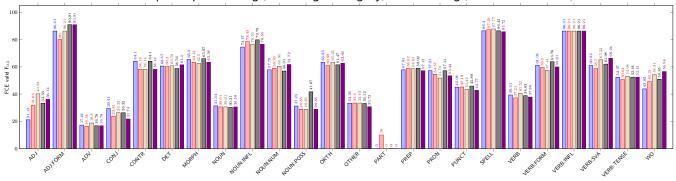
☐ functional word ☐ inflection ☐ word order ☐ word selection ☐ writing system



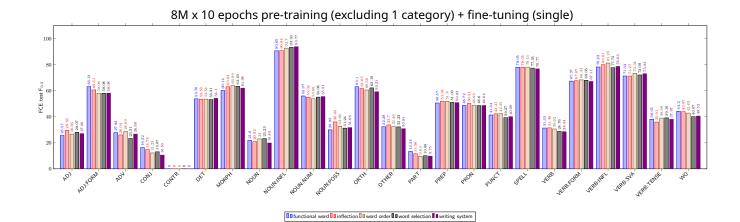


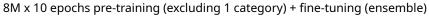


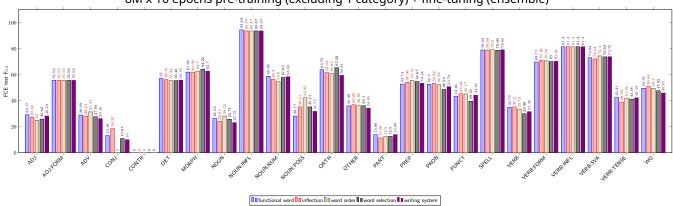


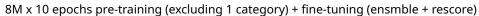


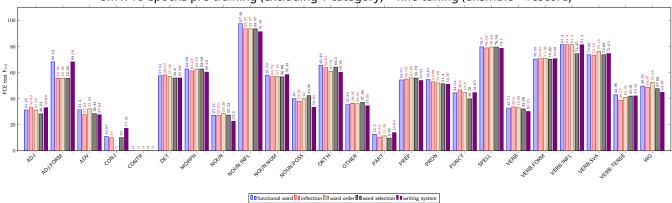
☐ functional word ☐ inflection ☐ ☐ word order ☐ ☐ word selection ☐ ☐ writing system

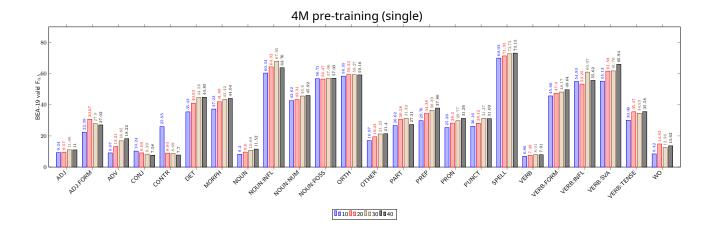


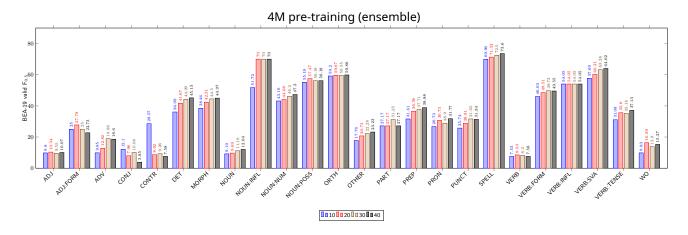


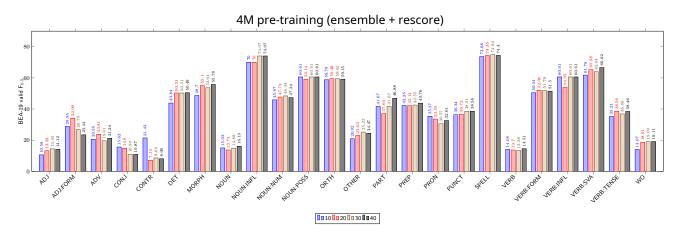


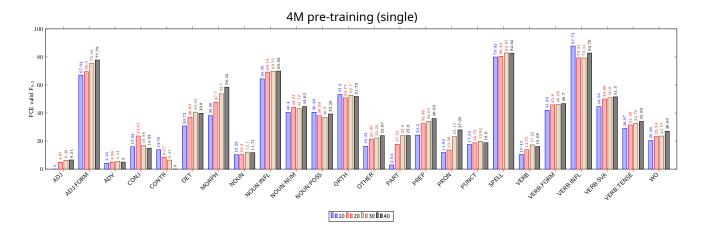


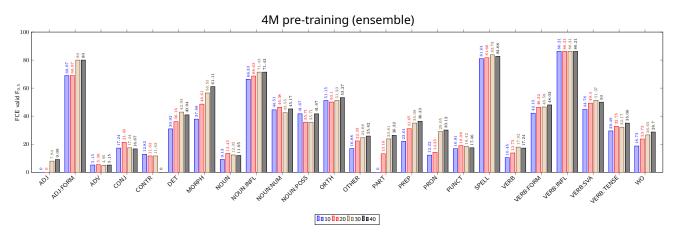


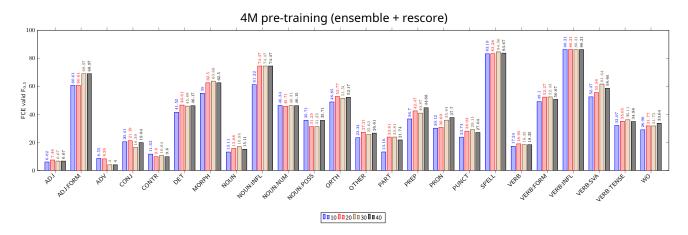


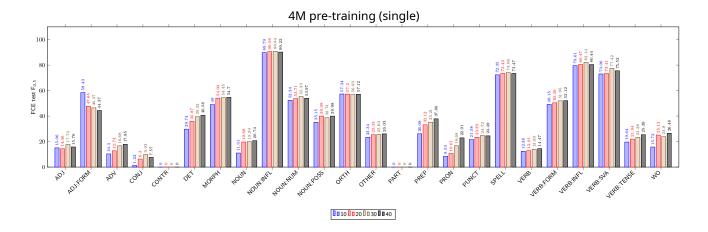


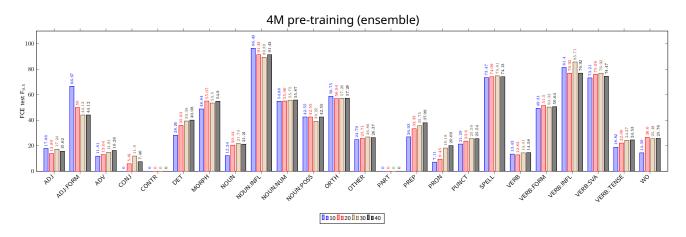


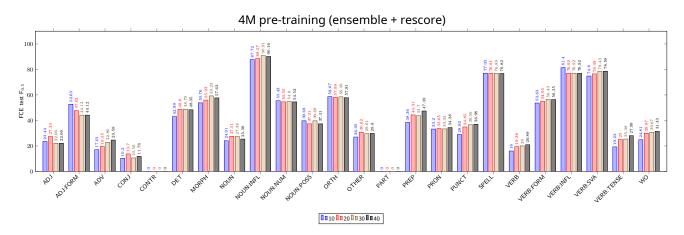


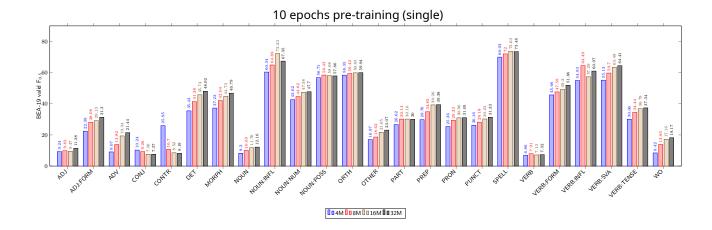


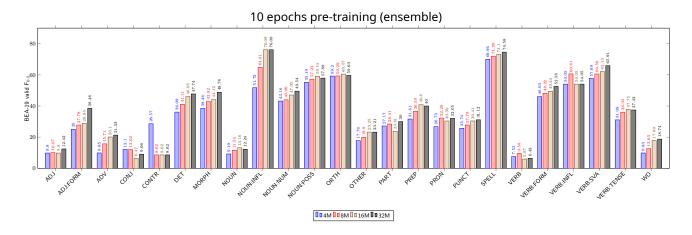


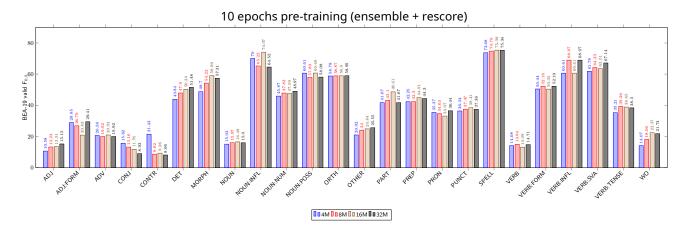


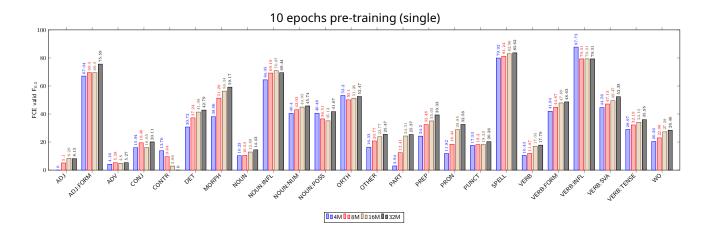


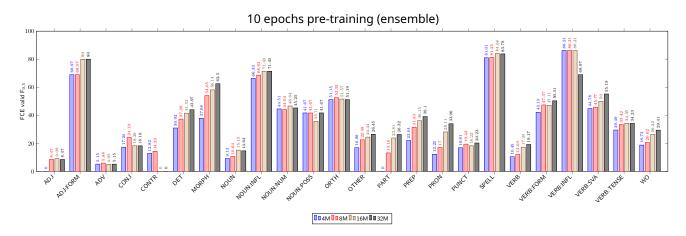


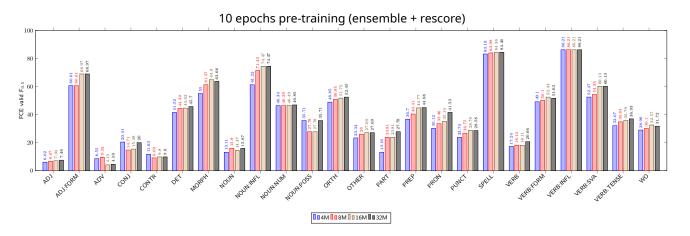


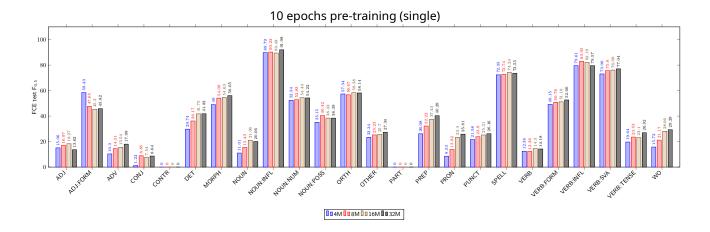


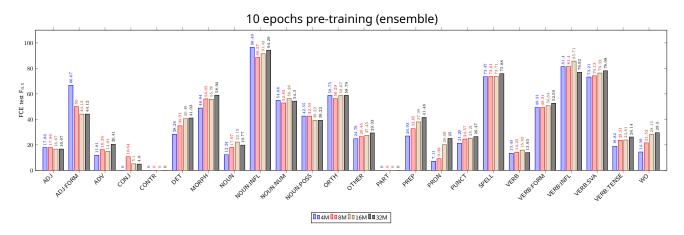


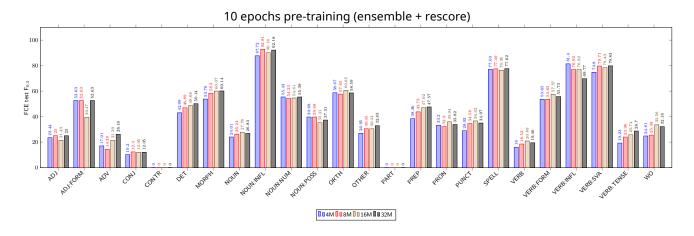


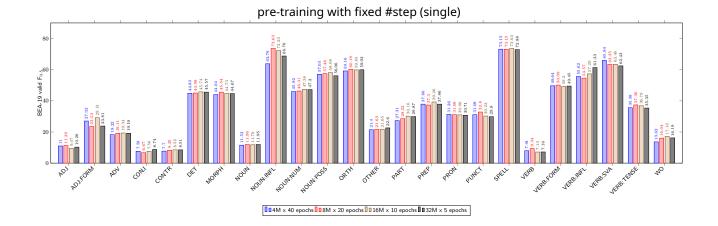


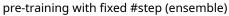


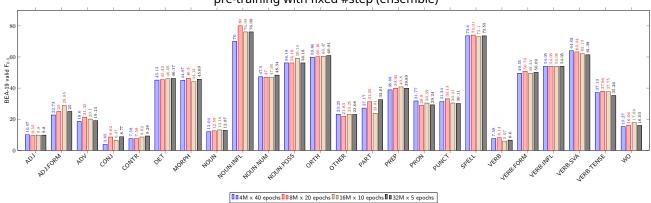




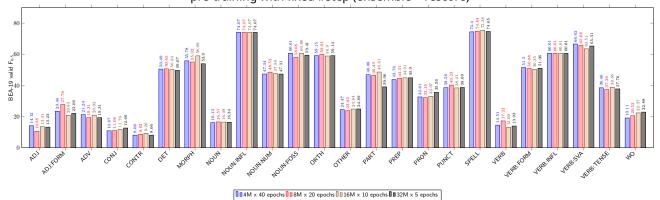


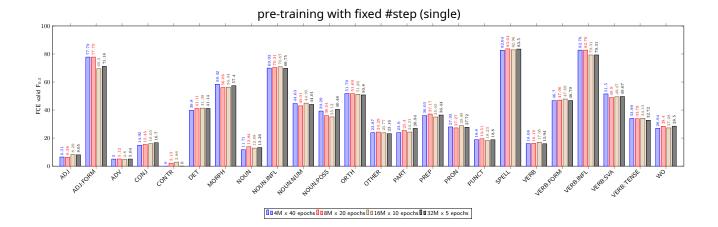


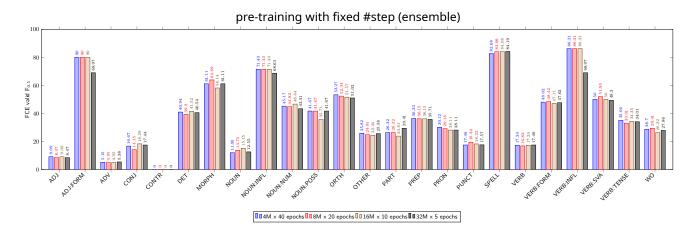


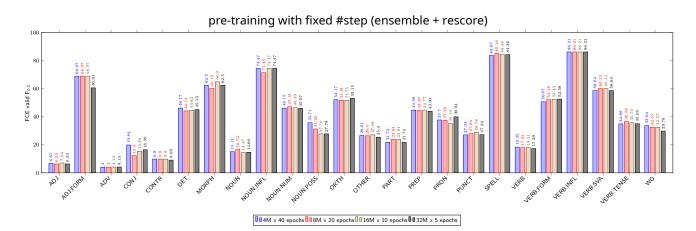


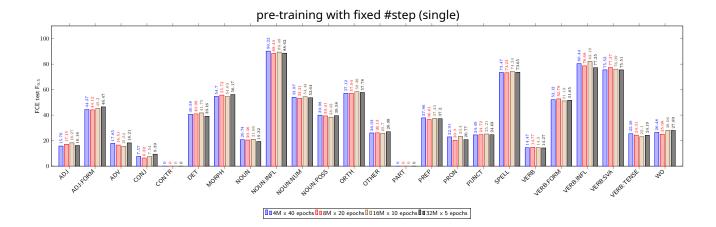
pre-training with fixed #step (ensemble + rescore)

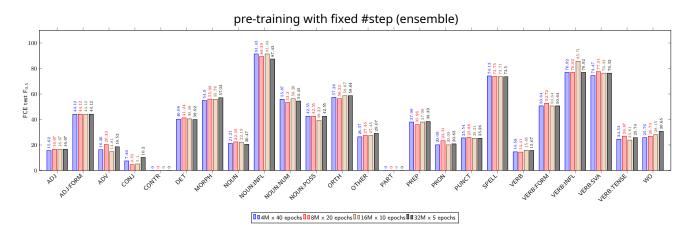


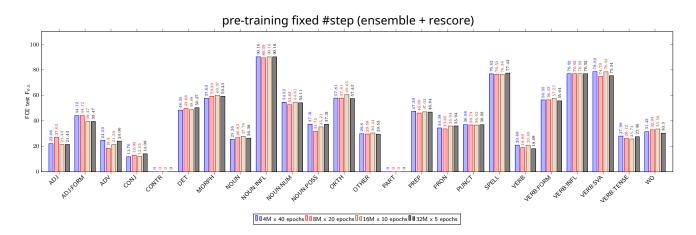


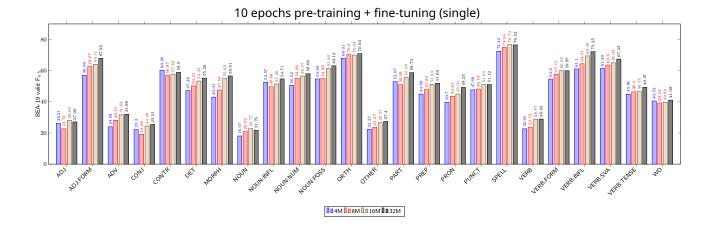


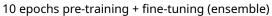


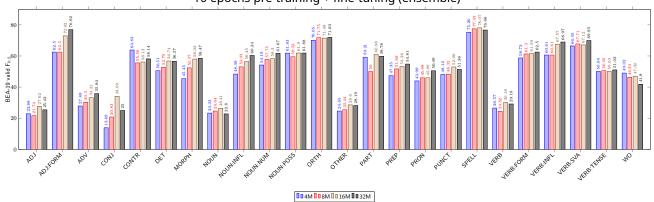




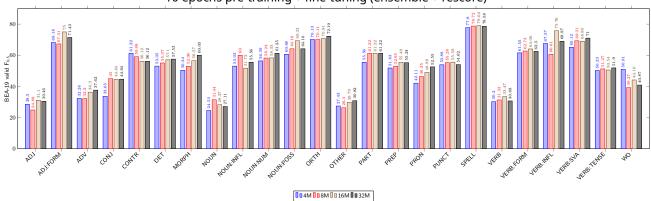


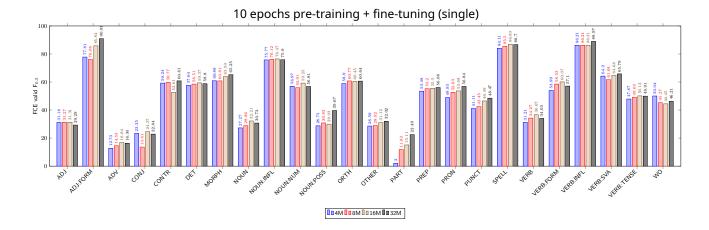


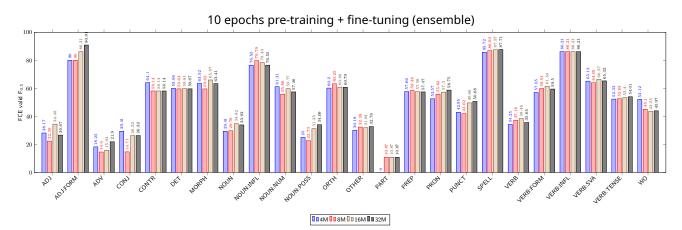


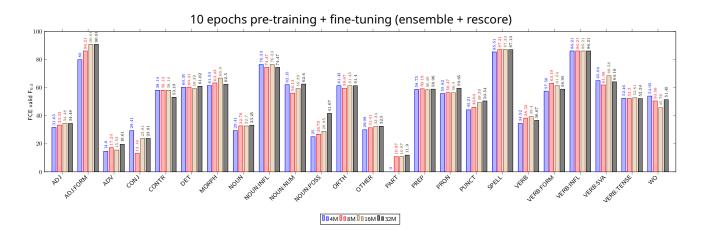


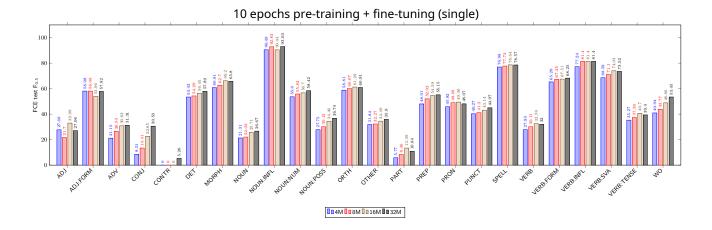
10 epochs pre-training + fine-tuning (ensemble + rescore)

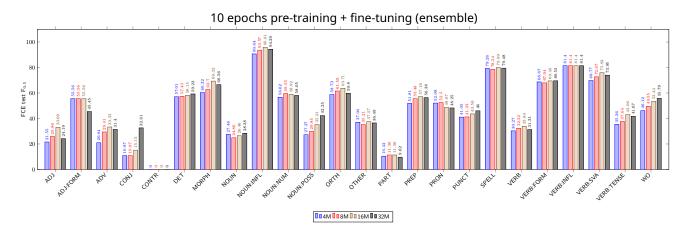


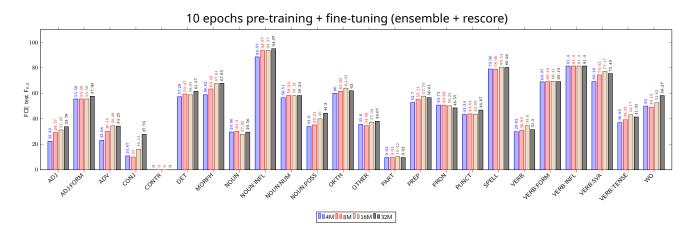


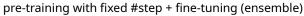












004M × 40 epochs 008M × 20 epochs 0016M × 10 epochs 0032M × 5 epochs

