Testing the Tolerance Principle on Corpus Data

Table 1: Summary of corpus data

	Age of first recording to first overregularizaiton error	files	words	input words	verbs	input verbs
Adam	2;3 - 2;11 (*feeled*)	18	39403	30366	6747	275
Eve	1;6 - 1;8 (*seed*)	5	5304	11253	564	136
Sarah	2;3 - 2;10 (*topped*)	33	18778	27682	1759	293
Peter	1;3 - 2;6 (*broked*)	14	52769	95180	7532	633
Naomi	1;3 - 1;11 (*doed*)	20	8009	9634	1240	222
Allison	1;5 - 2;11 (*throwed*)	6	4605	9366	612	140
April	1;10 - 2;1 (*boughted*)	2	1376	4435	128	100
Fraser	2;0 - 2;5 (*seed*)	90	137407	222200	13924	566
Fraser_3		3	1616	3304	1362	577
Fraser_4		4	1148	1495	1160	640
Fraser_5		5	1485	1866	1339	757
Fraser_6		6	1373	3206	1968	945

Table 2: Number of observed total number of verb types, irregular verbs and exponents

	U_p	α_p	U_c	α_c	e_p	β_p	e_c	β_c
Adam	275	0.69	270	0.66	70	0.64	62	0.61
Eve	136	0.74	91	0.84	50	0.65	36	0.73
Sarah	293	0.71	189	0.77	68	0.58	48	0.62
Peter	633	0.64	424	0.69	83	0.51	67	0.54
Naomi	222	0.77	128	0.76	62	0.63	43	0.66
Allison	140	0.77	88	0.87	44	0.68	36	0.84
April	100	0.84	50	1.23	37	0.80	19	1.23
Fraser	566	0.56	358	0.60	97	0.44	78	0.49
Fraser_3	155	0.80	84	0.85	54	0.64	38	0.70
Fraser_4	131	0.78	91	0.84	43	0.61	36	0.67
Fraser_5	145	0.79	95	0.8	53	0.63	33	0.61
Fraser_6	179	0.76	135	0.85	57	0.6	39	0.71

Insert all the numbers in table **??** to formulas below where ($U = N$):

(1) Time complexity for a list of N items without a productive rule (T_N):
$$T_N = \sum_{k=1}^{N} (r_i \cdot \frac{1}{r_i^{\alpha} \cdot H_{N,\alpha}}) = \frac{H_{N,\alpha-1}}{H_{N,\alpha}}$$

(2) Time complexity for a list with e exceptions and a productive rule (T_R):
$$T_R = \frac{H_{e,\beta-1}}{H_{e,\beta}} \cdot \frac{e}{N} + (1 - \frac{e}{N}) \cdot e$$

(3) A productive rule will be derived when $T_R \leq T_N$:
$$\frac{H_{e,\beta-1}}{H_{e,\beta}} \cdot \frac{e}{N} + (1 - \frac{e}{N}) \cdot e \quad \leq \frac{H_{N,\alpha-1}}{H_{N,\alpha}}$$

Table 4 showed that to produce a rule, expected N number of verb types need to be either produced by the child or learned from the parent. However, only observed U number of verb types have been found in corpus.

Table 3: Comparison between observed time complexity

	observed children's production			observed parents' input		
	T_R	T_N	$T_R \leq T_N$	T_R	T_N	$T_R \leq T_N$
Adam	52.53	78.07	True	57.92	76.24	True
Eve	26.27	22.55	**False**	37.66	36.94	**False**
Sarah	39.94	47.90	True	57.62	78.67	True
Peter	60.18	115.04	True	76.05	181.99	True
Naomi	32.94	34.03	True	50.37	55.54	True
Allison	25.46	21.03	**False**	34.65	36.42	True
April	13.44	8.13	**False**	27.34	24.48	**False**
Fraser	67.27	110.64	True	86.71	181.58	True
Fraser_3	26.36	20.75	**False**	41.38	38.27	**False**
Fraser_4	26.52	22.55	**False**	33.77	33.82	True
Fraser_5	25.61	24.69	**False**	40.08	36.56	**False**
Fraser_6	31.33	31.41	True	45.03	46.24	True

Table 4: Mismatch between observed U and TP predicted N

	Observed U	Expected N
Eve's production	91	120
Eve's input	136	141
Allison's production	88	117
April's production	50	152
April's input	100	111
Fraser_3's production	84	94
Fraser_3's input	155	176
Fraser_4's production	91	121
Fraser_5's production	95	101
Fraser_5's input	145	169