Supplementary Materials

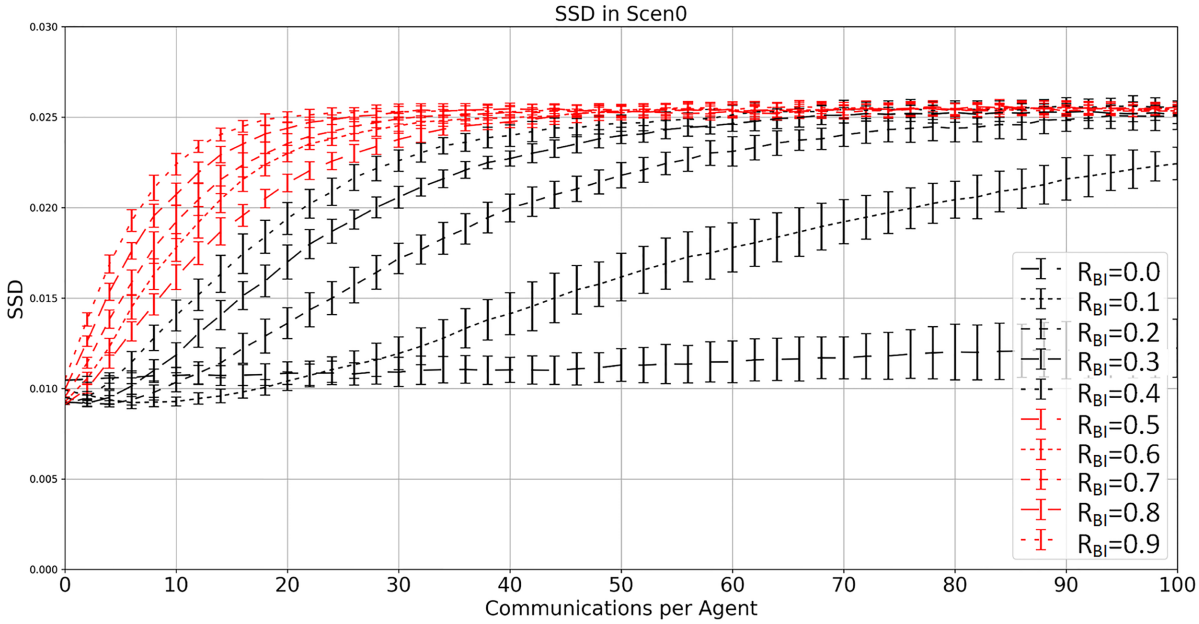
Consonant frequencies in SWM, Lizu (Duoxu_PCVG), and Duoxu

Table A1. Consonant frequencies in SWM, Lizu, and Duoxu ("Cons."=consonant, "Occur."=occurrence, "Freq."=frequency, "Diff."=difference). Empty cells indicate that the language does not have those consonants. Frequency columns show the normalized frequency of a consonant calculated from its number of occurrence. Difference columns show the occurrence and frequency differences of corresponding consonants between Lizu and Duoxu: "+" means that Duoxu has more occurrences (or higher frequency) of a consonant, "-" means that Duoxu has fewer occurrences (or lower frequency) of a consonant.

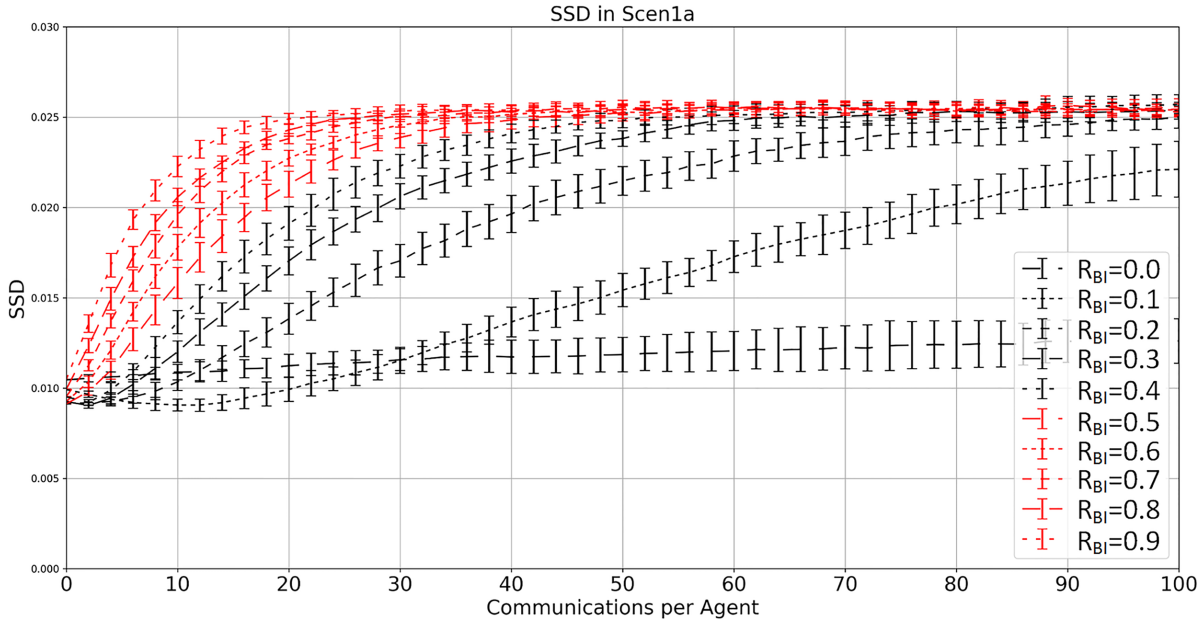
Tag	Cons.	SWM		Lizu		Duoxu		Dif.	Dif.
		Occur.	Freq.	Occur.	Freq.	Occur.	Freq.	in occur.	in freq.
1	p	140	0.0673	97*	0.0434	62	0.0292	-35	-0.3608
2	p^h	55	0.0265	50*	0.0224	58	0.0273	+8	+0.1600
3	b			120*	0.0537	95	0.0447	-25	-0.2083
4	m	116	0.0558	165*	0.0738	226*	0.1065	+61	0.3697
5	w	55	0.0265	45	0.0201	107	0.0504	+62	1.3778
6	t	149	0.0717	100	0.0447	43	0.0203	-57	-0.5700
7	t^h	111	0.0534	48*	0.0215	31	0.0146	-17	-0.3542
8	d			106*	0.0474	52*	0.0245	-54	-0.5094
9	ts	148	0.0712	35	0.0157	25	0.0118	-10	-0.2857
10	ts^h	30	0.0144	91*	0.0407	50	0.0236	-41	-0.4506
11	dz			49*	0.0219	27	0.0127	-22	-0.4490
12	n	43	0.0207	54	0.0242	40	0.0188	-14	-0.2593
13	s	62	0.0298	66	0.0295	43	0.0203	-23	-0.3485
14	z			39	0.0175	22	0.0104	-17	-0.4359
15	ɻ			61	0.0273			-61	-1.0000
16	l	100	0.0481	110	0.0492	116	0.0546	+6	0.0546
17	ɬ			22	0.0098			-22	-1.0000
18	tʃ	82	0.0394	27	0.0121	9	0.0042	-18	-0.6667
19	$tʃ^h$	70	0.0337	60*	0.0268	27	0.0127	-33	-0.5500
20	dʒ			78*	0.0349	29	0.0137	-49	-0.6282
21	ʃ	140	0.0673	76*	0.0340	52	0.0245	-24	-0.3158
22	ʒ	24	0.0115	19*	0.0085	33	0.0155	+14	0.7368
23	tɕ	127	0.0611	46	0.0206	98	0.0462	+52	1.1304
24	$tɕ^h$	84	0.0404	42*	0.0188	101	0.0476	+59	1.4048
25	dʑ			63*	0.0282	88	0.0415	+25	0.3968
26	ɲ	48	0.0231	65	0.0291	97	0.0457	+32	0.4923
27	ɕ	103	0.0495	14	0.0063	76	0.0358	+62	4.4285
28	ʑ			33	0.0148	25	0.0118	-8	-0.2424
29	j	152	0.0731	61	0.0273	127	0.0598	+66	1.0820
30	k	114	0.0548	66	0.0295	105	0.0495	+39	0.5909
31	k^h	51	0.0245	74*	0.0331	96	0.0452	+22	0.2973
32	g			80*	0.0358	91	0.0429	+11	0.1375
33	ŋ	9	0.0043	24	0.0107	17	0.0080	-7	-0.2917
34	x			25*	0.0112	37	0.0174	+12	0.4800
35	[f]	66	0.0317	15	0.0067	12	0.0057	-3	-0.2000
36	ɣ [ʁ]			19	0.0085	6	0.0028	-13	-0.6842

37	q	40	0.0179	-40	-1.0000
38	q^h	14	0.0063	-14	-1.0000
39	ɢ	6	0.0027	-6	-1.0000
40	ɦ̃ [ɦ̃]	30	0.0134	-30	-1.0000

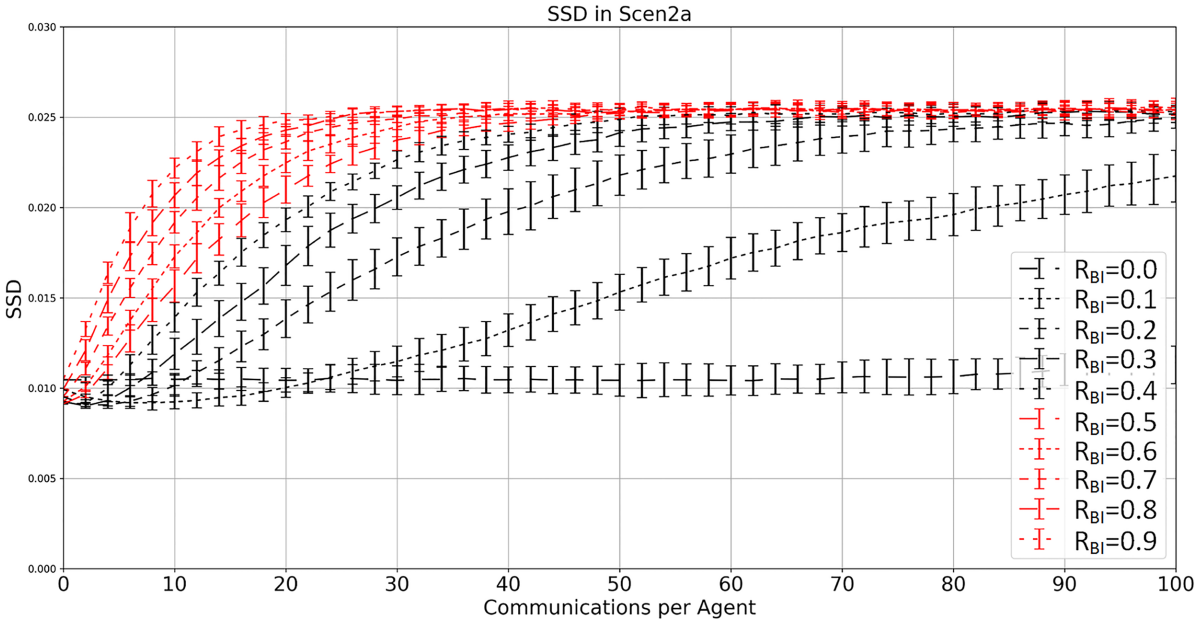
*: also includes occurrences of these initial consonants in clusters (e.g. /bɹ, bz, Nd, Ntɕ^h/ etc.)



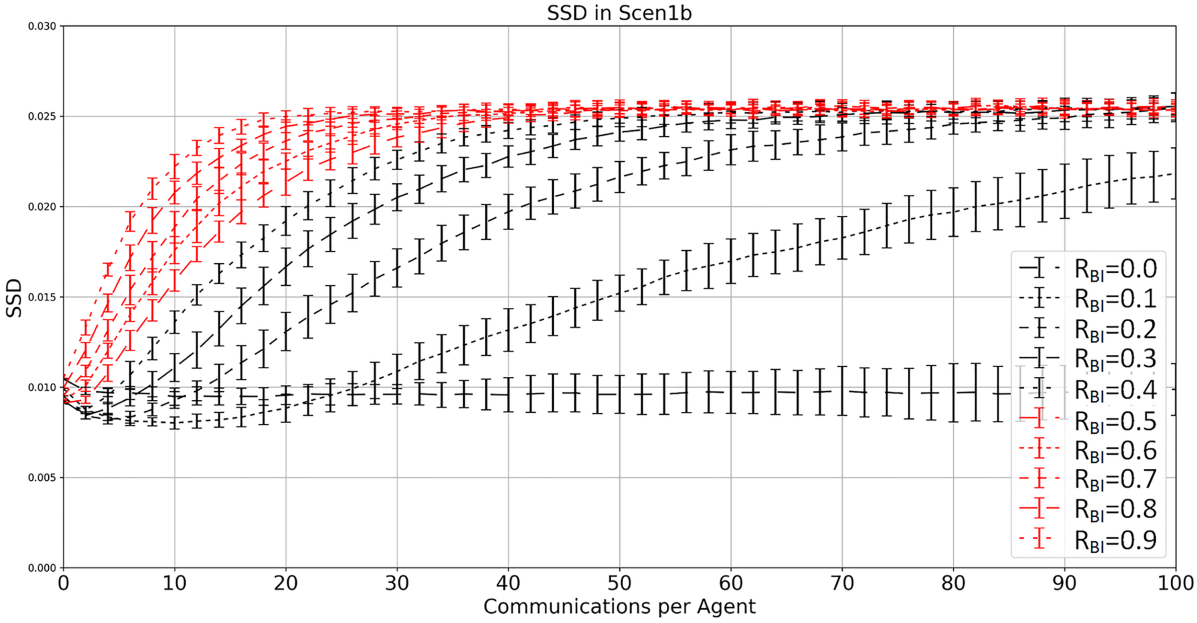
(a)



(b)



(c)



(d)

Figure A1. Mean SSD values obtained throughout 10,000 communications in scenario 0 (a), 1a (b), 2a (c), and 1b (d). Each curve in each figure corresponds to the result under a particular R_{BI}. Results are averaged over 20 runs in each condition.

Effects of F_{MKD} and F_{ADJ}

In this section, we briefly discuss the effects of the parameters F_{MKD} and F_{ADJ}. For the sake of simplicity, we fix the values of all other model parameters and vary the values of F_{MKD} and F_{ADJ} to examine their effects on the dynamics of the system. The results are based on the average SSD values obtained at each sampling point over 20 runs of the same setting. Since most discussion in the main text concerns a small R_{BI}, here, we fix R_{BI} as 0.1. The values of the other parameters (such as N_P, N_C, and N_{CONS}) are the same as those in the main text. For

each of the two parameters F_{MKD} and F_{ADJ}, we select two additional values, one larger and the other smaller than the value set in the simulations in the main text.

F_{MKD} is used in scenarios 1a and 1b. Together with the current value of 0.01 used in the simulations, we select another two values (0.005 and 0.05) for comparison. Figure A2 shows the average SSD values throughout the simulations in scenario 1a under these values (0.005, 0.01, and 0.05). Note that in this scenario, where low frequency of occurrence and markedness take effect only in bilingual-bilingual communications, the SSD values under all three F_{MKD} values are similar throughout the simulations.

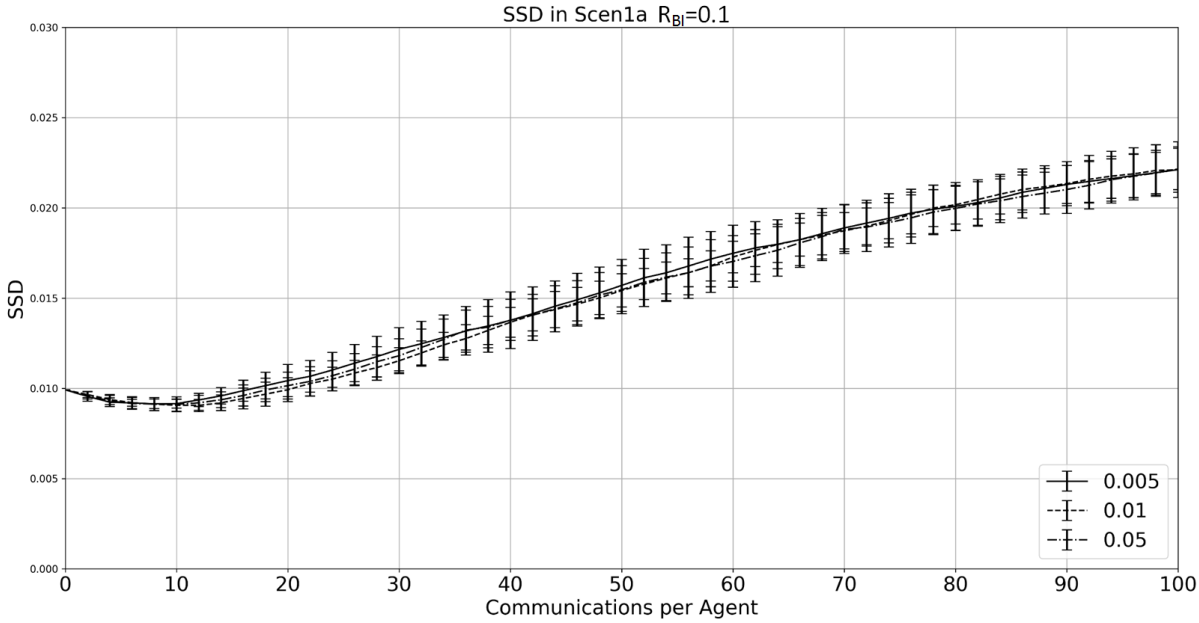


Figure A2. Mean SSD values obtained throughout 10,000 communications in scenario 1a under R_{BI}=0.1. Each curve represents the average results over 20 runs under a particular F_{MKD}.

F_{ADJ} takes effect in all four scenarios. Here, we only consider scenario 2b, and together with the current value (0.002) in the simulations reported in the main text, we choose another two values (0.001 and 0.005). Figure A3 shows the average SSD values throughout the simulations in the two scenarios under the three values of F_{ADJ} (0.001, 0.002, and 0.005). It is shown that in this scenario, the SSD values under all three F_{ADJ} values are similar throughout the simulations.

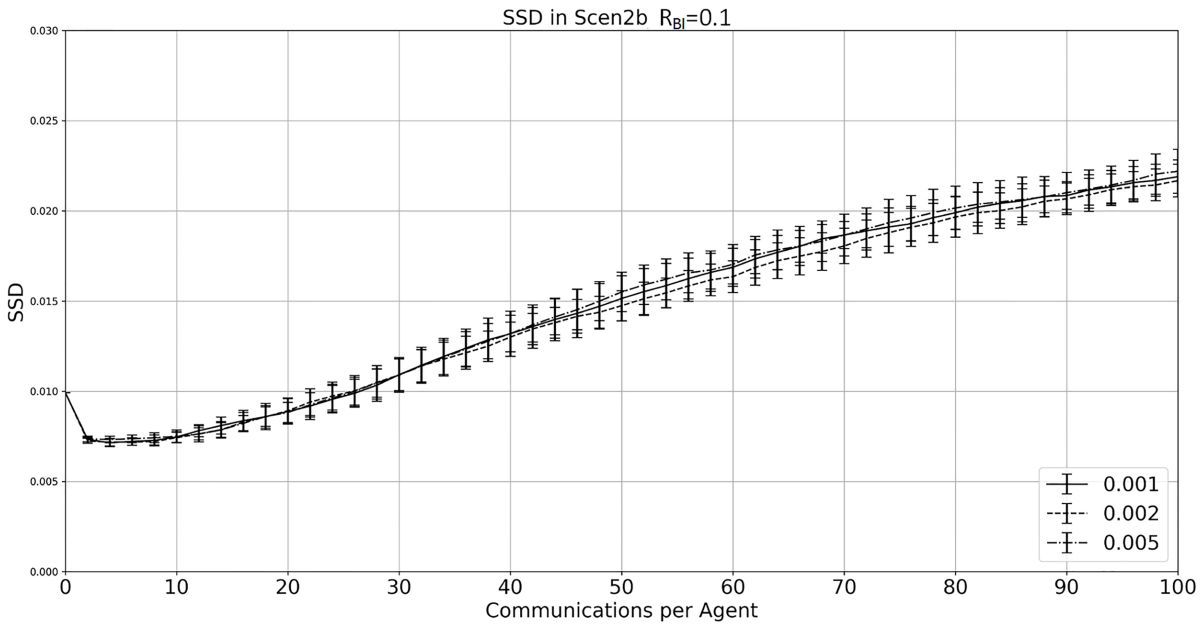


Figure A3. Mean SSD values obtained throughout 10,000 communications in scenario 2b under R_{BI}=0.1. Each curve represents the average results over 20 runs under a particular F_{ADJ}.