

1 Data-Sets

I used thirteen diverse data-sets (see Table 1 for details): a) Twitter data (used as test set in the paper (Cheng et al., 2010)) recording interactions among 2,585 people with 278,475 relationships where an act of social grooming was defined as using the “mention” or “reply” functions to communicate with others. I used the number of characters per day as the amount of social grooming v ; b) and c) Data from the Japanese SNS 755 (Takano and Fukuda, 2017) which provides two types of communication systems data which I treated as two different sets (see Fig. 1 of supplementary information in the paper (Takano and Fukuda, 2017) for specifications), namely data from group chats and that from wall communications. The former data records interactions among 17,796 users with 238,611 relationships, where I defined an act of social grooming as communicating in a chat limited to two members. The latter data records interactions among 20,000 users with 534,475 relationships, where I defined an act of social grooming as posting a comment on another’s wall. I removed data relevant to official users from both data-sets. I used the number of characters per day as the amount of social grooming v ; d) Data from Japanese avatar chat Ameba Pigg [18] which records interactions among 76,379 users with 1,610,710 relationships (see Fig. 2 of supplementary information in the paper (Takano and Fukuda, 2017) for specifications) where I defined an act of social grooming as communicating in a chat limited to two members. I used the number of characters per day as the amount of social grooming v ; e) Data from mobile phone calls (Madan et al., 2012) (Mobile phone (dormitory)), recording mobile phone calls among 73 people with 7,805 relationships where I defined an act of social grooming as one call to another. The subjects were undergraduates in a dormitory who probably communicated with unrelated people (the same is true of item f). I used duration per day as the amount of social grooming v ; f) Data from SMS (Madan et al., 2012) (SMS (dormitory)), which records SMS among 61 people with 2,266 relationships where I defined an act of social grooming as sending one message to another. I used frequency of messaging per day as the amount of social grooming v because I did not consider any information regarding the number of characters in this data-set; g) Data from E-mails and letters (Pachur et al., 2014) (E-mail/Letter (Pachur)), which records E-mail and letter communications among 40 people’s data for 100 days. This data was recorded together with data-sets of item j and k. These data-sets do not have the information of the amount of social grooming; h) Data from mobile phone calls (Aharony et al., 2011) (Mobile phone (friends & family)), recording mobile phone calls among 114 people with 2,264 relationships where I defined an act of social grooming as a call to another. The subjects were members of a young family living in a residential community which was constructed by kin and neighbors (the same is true of item i). I used frequency of calls per day as the amount of social grooming v ; i) Data from SMS (Aharony et al., 2011) (SMS (friends & family)), recording mobile phone calls among 109 people with 2,294 relationships where I defined an act of social grooming as a call to another. I used frequency of messaging per day as the amount of social grooming v ; j)

Data of face to face communication (Pachur et al., 2014) (Face to face (Pachur); see item g for details); k) Data from phone calls (Pachur et al., 2014) (Phone (Pachur); see item g for details); l) and m) Data of social grooming among Chacma baboons in two groups (Sick et al., 2014) (Baboon group A, B), which records fur cleaning behavior among 35 (B: 24) individuals with 266 (B: 225) relationships in 681 (B: 657) sessions, where the session is a quarter day (before 9 o'clock, 9-12 o'clock, 12-15 o'clock, and after 15 o'clock). I used the session instead of a day because this data-set does not have the date information. I used frequency of fur cleaning per session as the amount of social grooming v . Table 2 show the definitions of communication volume v .

In the data-sets from Twitter, 755 (group chat and wall communication) and Ameba Pigg, I limited the targets of analysis to active users who had greater number of social grooming days than the 50th percentile among Twitter users and the 75th percentile among 755 and Ameba Pigg users because these Internet service data-sets included many inactive users. In this paper, I defined the strength of social relationships d_{ij} as the days on which individual i does social grooming to individual j .

References

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Table 1: Summaries of data-sets. N and m were tallied for each individual, d was tallied for each relationship and v was tallied for each combination between relationship and day.

Communication System	Variable	Size	min	2.5%ile	25%ile	50%ile	75%ile	97.5%ile	max
Twitter	N	2,585	7	28	65	94	136	264	736
	m	2,585	1.25	1.84	2.79	3.55	4.66	8.61	25.23
	d	278,475	1	1	1	1	3	20	166
	v	943,719	2	21	54	94	136	383	14,120
755 group chat	N	17,796	1	1	5	9	17	51	187
	m	17,796	1.00	1.43	2.44	3.53	5.60	18.00	112.00
	d	238,611	1	1	1	2	4	18	112
	v	901,212	1	1	17	48	143	1,072	31,990
755 wall communication	N	20,000	1	1	6	11	24	159	1,372
	m	20,000	1.00	1.02	1.53	2.45	4.39	15.67	103.00
	d	534,475	1	1	1	1	2	13	121
	v	1,270,546	3	6	17	33	73	452	17,565
Ameba Pigg	N	76,379	1	1	7	13	26	86	689
	m	76,379	1.00	1.11	1.91	3.14	5.82	34.50	454.00
	d	1,610,710	1	1	1	1	3	25	457
	v	6,515,626	13	146	365	665	1,314	4,651	87,281
Mobile phone (dormitory)	N	73	2	16	47	94	126	279	688
	m	73	1.81	2.06	3.34	3.95	4.75	7.45	8.07
	d	7,801	1	1	1	1	2	32	207
	v	32,728	0	0	24	60	223	10,261	328,031
SMS (dormitory)	N	48	1	1	4	11	19	194	283
	m	48	1.00	1.00	1.68	2.85	4.03	11.35	30.5
	d	1,233	1	1	1	1	2	30	153
	v	4,942	1	1	1	3	7	36	168
E-mail/Letter (Pachur)	N	39	1	1	5	12	20	59.25	64
	m	39	1	1	1.4	1.79	2.24	3.20	3.29
	d	602	1	1	1	1	2	6.98	18
	v	1,257	-	-	-	-	-	-	-
Mobile phone (friends & family)	N	114	1	1	6	13.5	29.75	63.18	76
	m	114	1	1	1.64	2.17	3	5.81	7.67
	d	2,264	1	1	1	1	2	20.43	88
	v	6,821	1	1	1	1	2	6	251
SMS (friends & family)	N	109	1	1	6	15	33	59.3	113
	m	109	1	1	1.57	4.14	7.8	14.82	24.69
	d	2,294	1	1	1	2	5	50	189
	v	16,323	1	1	1	2	3	10	71
Face to face (Pachur)	N	39	1	1.95	41	56	83	125.3	131
	m	39	1	1	5.43	6.87	8.71	12.56	13.69
	d	2,370	1	1	1	3	40.78	100	-
	v	17,622	-	-	-	-	-	-	-
Phone (Pachur)	N	40	1	4.90	11.75	16	24	40.08	43
	m	40	1.37	1.59	2.42	3	3.97	5.44	5.95
	d	733	1	1	1	2	4	15	51
	v	2,565	-	-	-	-	-	-	-
Baboon group A	N	35	1	1	3.5	7	11	17.45	20
	m	35	1	1	1.23	1.67	2.26	3.03	3.91
	d	266	1	1	1	1	2	8	14
	v	549	1	1	1	1	2	4	8
Baboon group B	N	24	1	2.15	5.75	10	13	16.43	17
	m	24	1	1	1.49	1.97	2.85	4.56	4.80
	d	225	1	1	1	2	3	9.4	18
	v	579	1	1	1	1	2	4	8

Table 2: Definitions of communication volume v .

Communication System	Definition of v
Twitter	Number of characters
755 group chat	Number of characters
755 wall communication	Number of characters
Ameba Pigg	Number of characters
Mobile phone (dormitory)	Duration
SMS (dormitory)	Frequency of messaging
E-mail/Letter (Pachur)	Unavailable
Mobile phone (friends & family)	Frequency of calls
SMS (friends & family)	Frequency of messaging
Face to face (Pachur)	Unavailable
Phone (Pachur)	Unavailable
Baboon group A	Frequency of fur cleaning
Baboon group B	Frequency of fur cleaning