

Supplemental Figures and Tables

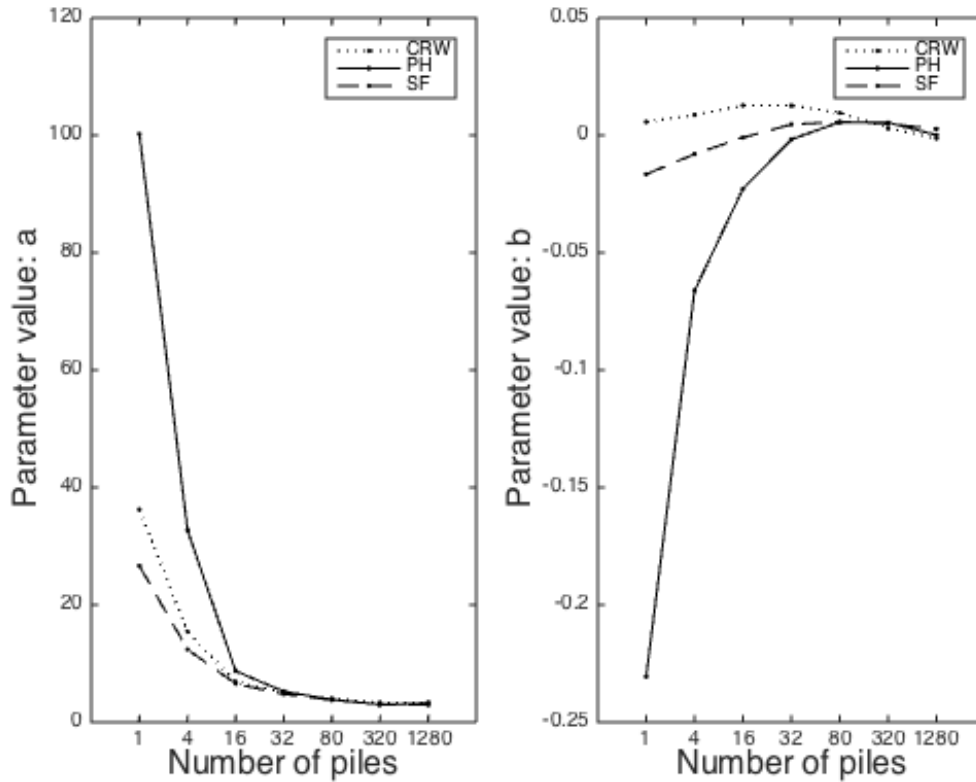


Figure 1. Plot of parameter values for simulation regressions of the form $Y=Ae^{Bx}$. The lines join the parameter values for one behavior. (a) Plot of parameter A versus spatial distribution, (b) plot of parameter B versus spatial distribution, for three behaviors, correlated random walk (CRW), pheromone recruitment (PH) and site fidelity (PH). Parameter values asymptote towards the same value as distributions increase in number of piles. The values are distinct for pheromone recruitment only in clustered distributions.

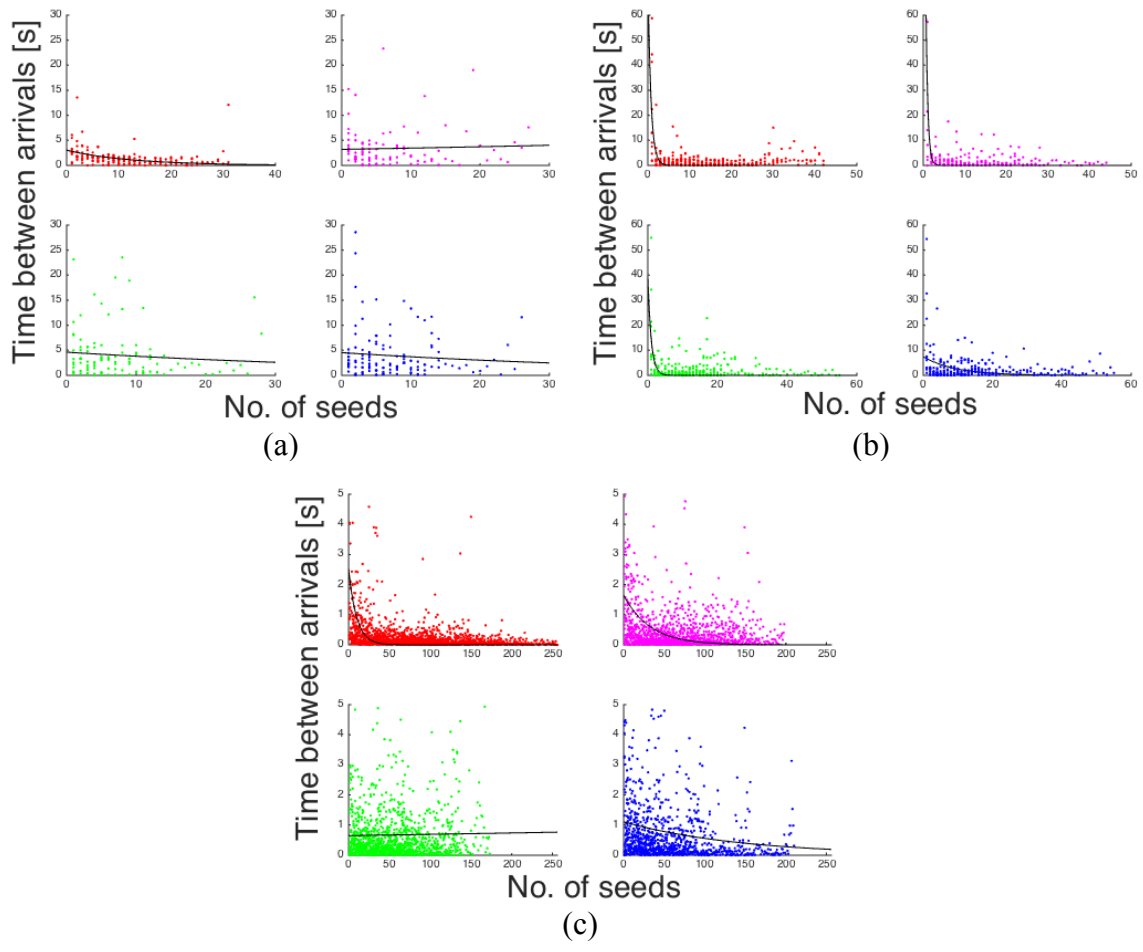


Figure 2. Exponential regression for time between arrivals versus cumulative number of collected seeds for three species of harvester ants, (a) *P. desertorum*, (b) *P. maricopa*, and (c) *P. rugosus*. Black solid curves represent exponential regressions. Each marker color represents the number of piles in a seed distribution. Red represents distribution with one pile, purple represents a distribution with 4 piles, green represents a distribution with 16 piles, and blue represents randomly distributed seeds. Only the species with largest colony size (c) shows an exponential decline in times between arrivals in clustered distributions, characteristic of a feedback loop that suggests recruitment. Regressions for

the smaller species, *P.desertorum* are not different than linear regressions, showing no evidence of recruitment. Regressions for *P.maricopa* show a very steep initial decline that quickly flattens ($B \lll 0$), suggesting no change between most times between arrivals.

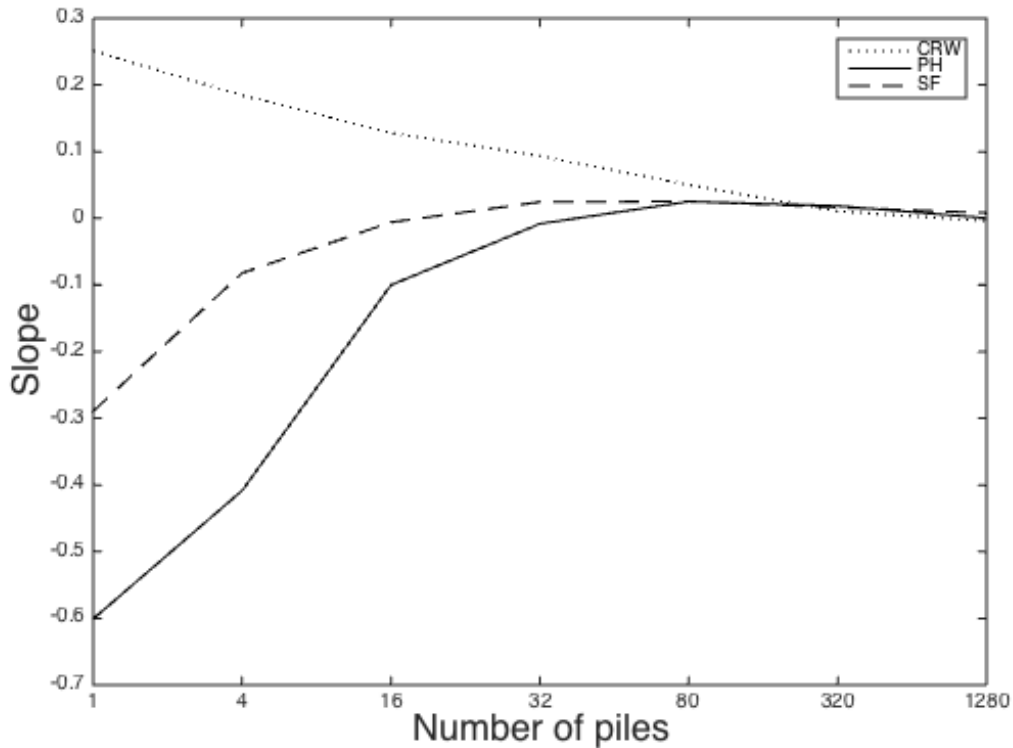


Figure 3. Plot of parameter values for the slope (p_1) of linear regressions of the form $y=p_1x+p_2$ versus number of piles in spatial distributions. The lines join the parameter values for one of three behaviors, correlated random walk (CRW), pheromone recruitment (PH) and site fidelity (PH). Negative slopes for time between arrivals are characteristic of information-based behaviors on clustered distributions. Slopes that correspond to information-based behaviors (PH and SF) are distinct from those generated

by CRW in clustered distributions. All parameter values asymptote towards zero as distributions increase in number of piles.

(a) Simulated data. Parameter A for Exponential regressions of the form $Y=Ae^{Bx}$

	CRW	PH	SF
1	36.2618	100.1837	26.6220
4	15.4554	32.7124	12.3995
16	6.8543	8.7057	6.5611
32	5.0853	5.2511	4.7850
80	4.0391	3.8682	3.7783
320	3.3174	3.0075	3.0204
RND	3.3758	3.2314	2.9446

(b) Simulated data. Parameter B for Exponential regressions of the form $Y=Ae^{Bx}$

	CRW	PH	SF
1	0.0057	-0.2306	-0.0166
4	0.0087	-0.0662	-0.0080
16	0.0127	-0.0228	-0.0010
32	0.0127	-0.0018	0.0046
80	0.0095	0.0056	0.0058
320	0.0030	0.0054	0.0049
RND	-0.0013	0.0001	0.0027

Table 1. Parameter values (a) A and (b) B for exponential regressions of time between arrivals versus number of seeds for simulated data. Each row contains values obtained for one spatial distribution. The number of seed piles in the distribution is shown on the left-most column. Each column contains the parameter values obtained with one behavior. The behavior is indicated in the first row of each column; CRW=correlated random walk; PH=pheromone recruitment; SF=site fidelity

(a) Simulated data. Parameter $p1$ for Exponential regressions of the form $y=p1x+p2$

	CRW	PH	SF
1	0.2511	-0.6008	-0.2894
4	0.1847	-0.4084	-0.0821
16	0.1282	-0.1000	-0.0059
32	0.0936	-0.0082	0.0245
80	0.0501	0.0252	0.0254
320	0.0105	0.0186	0.0164
RND	-0.0039	0.0003	0.0081

(b) Simulated data. Parameter $p2$ for Exponential regressions of the form $y=p1x+p2$

	CRW	PH	SF
1	0.2511	-0.6008	-0.2894
4	0.1847	-0.4084	-0.0821
16	0.1282	-0.1000	-0.0059
32	0.0936	-0.0082	0.0245
80	0.0501	0.0252	0.0254
320	0.0105	0.0186	0.0164
RND	-0.0039	0.0003	0.0081

Table 2. Parameter values for linear regressions of time between arrivals versus number of seeds for simulated data. Each row contains values obtained for one spatial distribution. The number of seed piles in the distribution is shown on the left-most column. Each column contains the parameter values obtained with one behavior. The behavior is indicated in the first row of each column; CRW=correlated random walk; PH=pheromone recruitment; SF=site fidelity. Notice the negative values of $p1$ (negative slope) in clustered distributions when recruitment and site fidelity are used.

(a) Simulated data. RMSE for Exponential regressions

	CRW	PH	SF
1	49.0588	26.5956	21.6666
4	23.4716	17.7703	12.0968
16	11.4679	7.1064	7.3973
32	8.3738	5.9722	6.1668
80	5.9957	4.8194	4.8023
320	3.9223	3.6274	3.5908
RND	3.2978	3.2457	3.1387

(b) Simulated data. RMSE for Linear regressions

	CRW	PH	SF
1	49.0515	28.9364	21.6787
4	23.4580	18.1970	12.0966
16	11.4603	7.1310	7.3973
32	8.3704	5.9723	6.1670
80	5.9952	4.8194	4.8023
320	3.9224	3.6276	3.5910
RND	3.2978	3.2457	3.1388

Table 3. Goodness of fit measures (RMSE) for exponential (a) and linear (b) regressions of time between arrivals versus number of seeds for simulations. Exponential model is a better fit for clustered distributions when recruitment is used (Table a, values in gray box). Lower RMSE values indicate a better fit. Lower values are highlighted in bold.

(a) Natural data. Parameter A for exponential regressions of the form $Y=Ae^{Bx}$

	<i>P.desertorum</i>	<i>P.maricopa</i>	<i>P.rugosus</i>
1	3.0421	77.4178	2.5243
4	3.2029	259.7717	1.6478
16	4.6303	39.6232	0.6511
RND	4.5470	7.4603	1.1061

(b) Natural data. Parameter B for exponential regressions of the form $Y=Ae^{Bx}$

	<i>P.desertorum</i>	<i>P.maricopa</i>	<i>P.rugosus</i>
1	-0.1023	-1.3695	-0.0807
4	-0.0308	-2.1514	0.0076
16	0.0006	-1.0102	-0.0191
RND	-0.0068	-0.1083	-0.0201

Table 4. Parameters (a) A and (b) B for exponential regressions of time between arrivals versus number of seeds for natural data. Each row contains the values for one spatial distribution. The number of seed piles in the distribution is shown in the left column. Each column contains the values for one species. The species name is on the first row of each table.

(a) Natural data. Parameter p1 for linear regressions of the form $y=x*p1+p2$			
	<i>P.desertorum</i>	<i>P.maricopa</i>	<i>P.rugosus</i>
1	-0.0566	-0.0893	-0.0031
4	0.0232	-0.2445	-0.0039
16	-0.0611	-0.0747	0.0003
RND	-0.0634	-0.0712	-0.0038

(b) Natural data. Parameter p2 for linear regressions of the form $y=x*p1+p2$			
	<i>P.desertorum</i>	<i>P.maricopa</i>	<i>P.rugosus</i>
1	2.1500	3.8270	0.5787
4	3.2220	7.0070	0.8185
16	4.4960	3.7660	0.6561
RND	4.4130	3.9880	1.0050

Table 5. Parameters (a) $p1$ and (b) $p2$ for linear regressions of time between arrivals versus number of seeds for natural data. Each row contains the values for one spatial distribution. The number of seed piles in the distribution is shown in the left column. Each column contains the values for one species. The species name is on the first row of each table.

(a) Natural data. RMSE for exponential regressions of the form $Y=Ae^{Bx}$			
	<i>P.desertorum</i>	<i>P.maricopa</i>	<i>P.rugosus</i>
1	0.1275	0.3246	0.1028
4	0.0017	0.4323	0.0574
16	0.0077	0.1252	0.6511
RND	0.0071	0.0610	0.0252

(b) Natural data. RMSE for linear regressions of the form $y=p1*x+p2$			
	<i>P.desertorum</i>	<i>P.maricopa</i>	<i>P.rugosus</i>
1	0.0744	0.0260	0.0351
4	0.0015	0.0643	0.0233
16	0.0065	0.0306	0.0001
RND	0.0060	0.0324	0.0211

Table 6. Goodness of fit (RMSE) for exponential regressions (a) and linear regressions (b) of time between arrivals versus number of seeds for natural data. Each row contains the values for one spatial distribution. The number of seed piles in the distribution is shown in the left column. Each column contains the values for one species. The species name is on the first row of each table.