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Supplemental Information

**A Complex Hierarchy of Avoidance
Behaviors in a Single-Cell Eukaryote**

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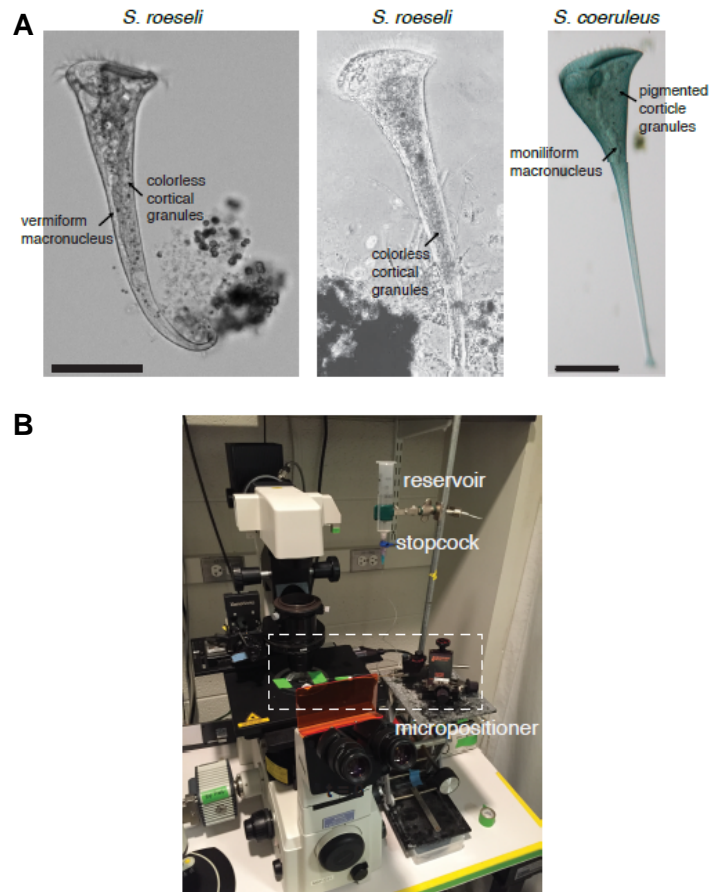


Figure S1: Ciliate identification and experimental setup, related to Figure 1. **A.** (Left) brightfield image of resting organism from our culture; (middle) image of confirmed specimen of *S. roeseli* from [S1]; (right) image of *S. coeruleus* from [S2, Figure 1]. Scale bars are 100 μm (left) and 500 μm (right); no scale bar was available for the middle image. The key characteristics which determine taxonomic classification are annotated: vermiform (“worm-like”) macronucleus and colourless cortical granules of *roeseli*, compared to moniliform (“beads-on-a-string”) macronucleus and blue-green colouration of *coeruleus*. **B.** Experimental setup, showing the microscope, camera, micropositioner and the reservoir and stopcock for generating pulses.

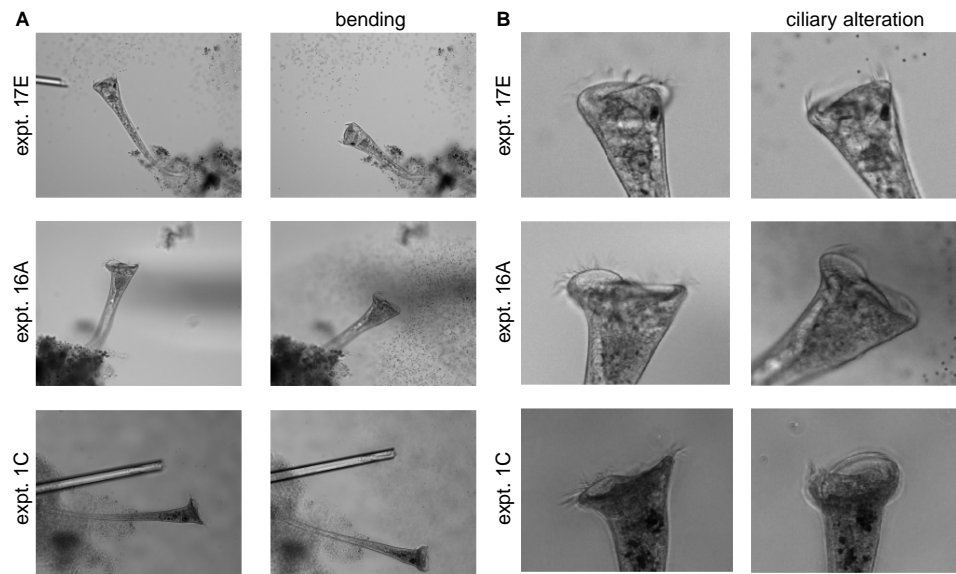


Figure S2: Bending and ciliary alteration, related to Figures 1 & 2. Compare in particular to Figure 1C and the enlarged views of frames 1 and 2 in Figure 2A. **A.** Three different organisms at rest (left) and bending (right) in response to stimulation. **B.** Three different organisms with normal ciliary motion for fluid ingestion (left) and with ciliary beating altered, in response to stimulation, to repel fluid from the oral cavity.

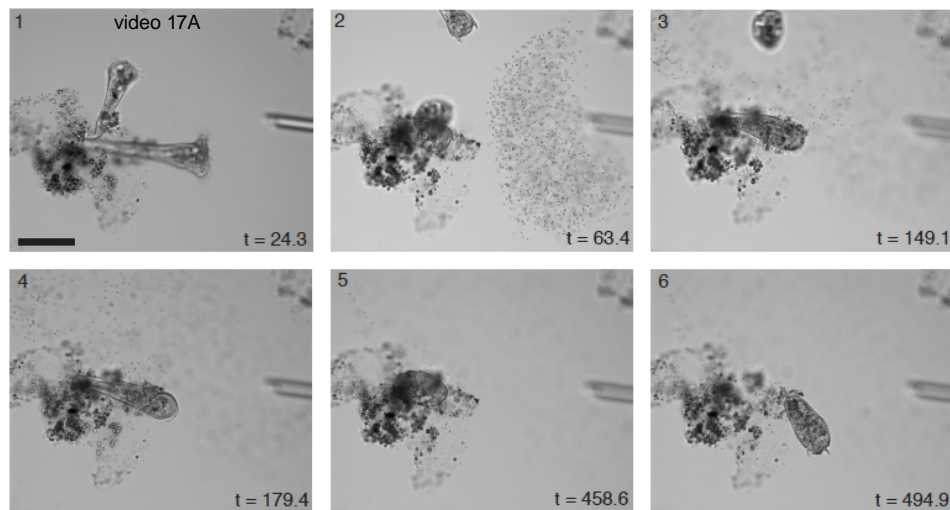


Figure S3: **Evidence for complex decision making, related to Figure 3.** Six frames, numbered in the top, left corner, are shown of two *S. roeseli* responding to the same stimulus. Both organisms contract (frame 2) but only one pulled up its holdfast (frames 4 and 5) and detached (frame 6).

M/D/Y	day #	access string
11/3/2014	1	55x67dbffm.1
11/5/2014	2	gc22z67kym.1
11/7/2014	3	s9v2vvdkp7.1
11/10/2014	4	rw3hyjg2h4.1
11/12/2014	5	2fxddcv48.1
11/14/2014	6	ss5mvybdxm.1
11/15/2014	7	vsky9mtyz3.1
11/25/2014	8	dbp2hxzktr.1
11/26/2014	9	n349ytw7b.1
12/3/2014	10	sgwk5k8fdd.1
12/5/2014	11	j48mvzsbhr.1
12/8/2014	12	86xh7z5rc3.1
12/9/2014	13	pbnzrc455v.1
12/10/2014	14	9wrxytg94g.1
12/15/2014	15	8m458vj5hb.1
1/21/2015	16	p2r3kb2tpj.1
1/22/2015	17	fdn8yy2npn.1
1/30/2015	18	65z4556dxz.1

Table S1: Experimental videos, related to Table 1. Videos for each day are collected in individual datasets on Mendeley. Each dataset is listed by date, in Month/Day/Year format, and experiment day number and can be accessed by postfixing the corresponding “access string” to <http://dx.doi.org/10.17632/>.

M/D/Y	expt. #	duration	behaviour	M/D/Y	expt. #	duration	behaviour
11/3/2014	1A	39		12/5/2014	11A	99	
11/3/2014	1B	21	A(0:13)	12/5/2014	11B	50	
11/3/2014	1C	13	A(0:09)	12/5/2014	11C	35	
11/3/2014	1D	10		12/5/2014	11D	49	
11/3/2014	1E	0		12/8/2014	12A	85	C(0:10)
11/3/2014	1F	0		12/8/2014	12B	30	
11/5/2014	2A	12		12/9/2014	13A	100	
11/7/2014	3A	0		12/10/2014	14A	28	
11/7/2014	3B	38		12/10/2014	14B	4	
11/7/2014	3C	38		12/10/2014	14C	20	
11/7/2014	3D	30		12/10/2014	14D	195	B(2:38)
11/10/2014	4A	16		12/10/2014	14E	50	
11/10/2014	4B	50		12/15/2014	15A	48	
11/10/2014	4C	15		12/15/2014	15B	5	
11/10/2014	4D	17	A(0:07)	12/15/2014	15C	15	
11/10/2014	4E	58		12/15/2014	15D	25	
11/10/2014	4F	7		1/21/2015	16A	105	
11/12/2014	5A	33	A(0:24), B(0:28)	1/22/2015	17A	58	
11/14/2014	6A	44		1/22/2015	17B	2	
11/14/2014	6B	74		1/22/2015	17C	99	B(0:31)
11/14/2014	6C	8		1/22/2015	17D	3	
11/14/2014	6D	31		1/22/2015	17E	19	
11/15/2014	7A	59		1/22/2015	17F	22	
11/25/2014	8A	231		1/22/2015	17G	25	
11/25/2014	8B	90		1/22/2015	17H	40	
11/26/2014	9A	0		1/22/2015	17I	33	A(0:15)
12/3/2014	10A	12	A(0:09)	1/30/2015	18A	78	
12/3/2014	10B	5		1/30/2015	18B	417	
12/3/2014	10C	10					

Table S2: Pre-stimulation baseline behaviour, related to Table 1. The notation follows that in Table 1. M/D/Y signifies Month, Day, Year. The “duration” column gives the amount of time in seconds between the start of recording and the first pulse of stimulation. The “behaviour” column gives which, if any, of the classified behaviours were observed during that period, using the same letter code as in Table 1. The numbers in brackets give the approximate time, shown as minute:seconds, at which the behaviour was observed. A blank entry signifies that no behaviours were observed. Table S1 gives access information for each video.

SUPPLEMENTAL REFERENCES

- [S1] Foissner W., Berger .B, and Kohmann F., eds. (1992). Taxonomische und ökologische Revision der Ciliaten des Saprobiensystems—Band II: Peritrichia, Heterotrichida, Odontostomatida (Munich: Landesamtes für Wasserwirtschaft).
- [S2] Slabodnick M. M., and Marshall W. F. (2014). *Stentor coeruleus*. Curr. Biol. 24, R783–4.