Table 1 Run-twiddle Analysis of Mutants Swimming in a Homogeneous, Isotropic Medium

Strain Type	AW405 Wild type	*Unc* 602 Uncoordin- ated	*CheC* 497 Nonchemo- tactic
Number of bacteria tracked	35 *	10	14
Total tracking time (min)	20	3.0	2.7
Mean speed (μm/s) †	14.2 ± 3.4	14.4 ± 3.9	20.0 ± 4.9
Mean twiddle length (s)‡	0.14 ± 0.19	0.14 ± 0.24	0.10 ± 0.13
Mean run length (s)	0.86 ± 1.18	0.42 ± 0.27	6.3 ± 5.2
Mean change in direction from run to run (°)	68 ± 36	74 ± 33	33 ± 15
Mean change in direction during runs (°)	23 ± 23	18 ± 23	35 ± 22
Mean angular speed while twiddling (°/word)§	56 ± 29	54 ± 27	41 ± 32
Mean angular speed while running (°/word)§	14 ± 9	19 ± 9	9 ± 6

Data points (words) were generated at the rate of 12.6 per second. The beginning of a run was scored if the angular speed § was less than 35°/word for three successive words. The end of a run was scored if the angular speed was greater than 35°/word for two successive words or if it was greater than 35°/word for one word, provided, in the latter case, that the change in the average direction between successive pairs of words was also greater than 35°. The angular speed is sensitive to short term fluctuations in the data. These depend on the ways in which the bacteria wobble and on the time constants (0.08 s) of the circuits which precede the analogue-to-digital converter. The time constants, the recording rate and the value 35°/word were chosen empirically by comparing results of digital analyses with plots of the kind shown in Fig. 1.

* Experiments done with three different cultures.

† The values are the means ± one standard deviation. In the calculation of the mean speed the mean for each bacterium is weighted equally, and the standard deviation is the standard deviation in the mean.

‡ In this and in subsequent entries in the table each twiddle or run is weighted equally; the standard deviations are of the same order of magnitude as those found with a single bacterium.

§ The angular speed is the change in the direction of motion from one word (data point) to the next.