

Writing, speaking, & designing:



Three skills for
effective
communication

Phoebe Traquair, 1890's

<http://www.nls.uk/traquair/>





The University of
Nottingham

baskin@umass.edu

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1		fit_h.x	fit_h.y	fit_2h.x	fit_2h.y	fit_4h.x	fit_4h.y	fit_6h.x	fit_6h.y	fit_8h.x	fit_8h.y	der_h.x	der_h.y	der_2h.x	der_2h.y
2	1	0	0.00219599	0	0.00427176	0	0.00495103	0	0.00442373	0	0.00359221	0	0.00013898	0	2.54E-05
3	2	25	0.00500064	25	0.00498179	25	0.00501415	25	0.00461663	25	0.00395103	25	7.63E-05	25	1.41E-05
4	3	50	0.0061179	50	0.00530687	50	0.00512483	50	0.00485841	50	0.0043487	50	3.01E-05	50	7.53E-06
5	4	75	0.00609997	75	0.00542905	75	0.00528931	75	0.0051475	75	0.00478253	75	3.86E-06	75	4.82E-06
6	5	100	0.00564118	100	0.00548574	100	0.00551082	100	0.00548186	100	0.00525146	100	-3.98E-06	100	4.88E-06
7	6	125	0.0053292	125	0.00557196	125	0.00579022	125	0.00586021	125	0.00575399	125	5.61E-09	125	6.80E-06
8	7	150	0.00542118	150	0.00574573	150	0.00612601	150	0.00628073	150	0.00628837	150	7.83E-06	150	9.81E-06
9	8	175	0.00581553	175	0.0060366	175	0.0065168	175	0.0067416	175	0.00685286	175	1.43E-05	175	1.33E-05
10	9	200	0.00628009	200	0.00645131	200	0.00695909	200	0.00724113	200	0.00744529	200	1.88E-05	200	1.68E-05
11	10	225	0.00677426	225	0.00698081	225	0.00744906	225	0.00777716	225	0.00806333	225	2.33E-05	225	2.00E-05
12	11	250	0.00744556	250	0.00760756	250	0.00798331	250	0.00834793	250	0.00870525	250	2.81E-05	250	2.28E-05
13	12	275	0.00833803	275	0.00830833	275	0.00855782	275	0.0089513	275	0.0093693	275	3.11E-05	275	2.50E-05
14	13	300	0.00925856	300	0.00905887	300	0.00916915	300	0.00958536	300	0.01005369	300	3.10E-05	300	2.66E-05
15	14	325	0.01000747	325	0.00983548	325	0.00981409	325	0.01024858	325	0.01075667	325	2.93E-05	325	2.77E-05
16	15	350	0.01062253	350	0.01061621	350	0.01048927	350	0.01093797	350	0.01147644	350	2.90E-05	350	2.83E-05
17	16	375	0.01131313	375	0.0113824	375	0.01119295	375	0.01165139	375	0.01221122	375	3.06E-05	375	2.86E-05
18	17	400	0.0121829	400	0.01211859	400	0.01192339	400	0.01238697	400	0.01295924	400	3.17E-05	400	2.86E-05
19	18	425	0.01310553	425	0.01281657	425	0.01267872	425	0.01314231	425	0.01371873	425	3.04E-05	425	2.87E-05
20	19	450	0.01389281	450	0.01347807	450	0.01345738	450	0.01391499	450	0.01448792	450	2.68E-05	450	2.89E-05
21	20	475	0.01446942	475	0.01411952	475	0.01425778	475	0.01470339	475	0.01526508	475	2.30E-05	475	2.95E-05
22	21	500	0.01486979	500	0.01477347	500	0.01507876	500	0.01550504	500	0.01604848	500	2.11E-05	500	3.06E-05
23	22	525	0.01518968	525	0.01548055	525	0.01591797	525	0.0163175	525	0.01683642	525	2.30E-05	525	3.21E-05
24	23	550	0.01561976	550	0.01627848	550	0.01677339	550	0.01713854	550	0.01762721	550	2.95E-05	550	3.39E-05
25	24	575	0.01640647	575	0.01719089	575	0.0176417	575	0.01796597	575	0.01841921	575	3.92E-05	575	3.57E-05
26	25	600	0.01764985	600	0.01821174	600	0.01852001	600	0.01879556	600	0.0192108	600	4.80E-05	600	3.71E-05
27	26	625	0.01920338	625	0.01930556	625	0.01940391	625	0.01962673	625	0.02000037	625	5.22E-05	625	3.78E-05
28	27	650	0.02078337	650	0.02041769	650	0.02028949	650	0.02045728	650	0.02078637	650	5.05E-05	650	3.76E-05
29	28	675	0.02214474	675	0.02148643	675	0.02117208	675	0.02128503	675	0.02156729	675	4.39E-05	675	3.67E-05
30	29	700	0.02316006	700	0.02246323	700	0.02204739	700	0.02210786	700	0.02234162	700	3.53E-05	700	3.52E-05
31	30	725	0.02383885	725	0.02332708	725	0.02291178	725	0.02292371	725	0.02310791	725	2.77E-05	725	3.35E-05
32	31	750	0.02430205	750	0.02408737	750	0.02376049	750	0.02373059	750	0.02386475	750	2.28E-05	750	3.20E-05
33	32	775	0.02469624	775	0.02478267	775	0.02459026	775	0.02452656	775	0.02461077	775	2.12E-05	775	3.08E-05
34	33	800	0.0250901	800	0.02546219	800	0.02539933	800	0.02530977	800	0.02534461	800	2.24E-05	800	3.01E-05
35	34	825	0.02554147	825	0.0261688	825	0.02618584	825	0.02607844	825	0.02606497	825	2.68E-05	825	2.97E-05
36	35	850	0.02622237	850	0.02692247	850	0.02694789	850	0.02683086	850	0.02677059	850	3.36E-05	850	2.94E-05
37	36	875	0.02730546	875	0.0277152	875	0.02768566	875	0.02756541	875	0.02746025	875	3.98E-05	875	2.89E-05
38	37	900	0.02867351	900	0.02851399	900	0.02839943	900	0.02828052	900	0.02813274	900	4.05E-05	900	2.80E-05
39	38	925	0.02990634	925	0.02927212	925	0.02908998	925	0.0289747	925	0.02878694	925	3.44E-05	925	2.67E-05
40	39	950	0.03069042	950	0.02994964	950	0.02975863	950	0.02964652	950	0.02942172	950	2.50E-05	950	2.50E-05
41	40	975	0.03107721	975	0.03052672	975	0.03040599	975	0.0302946	975	0.03003601	975	1.66E-05	975	2.34E-05
42	41	1000	0.03124175	1000	0.03101413	1000	0.03103302	1000	0.03091764	1000	0.03062879	1000	1.15E-05	1000	2.21E-05
43	42	1025	0.03128413	1025	0.03144439	1025	0.03163973	1025	0.03151439	1025	0.03119908	1025	1.03E-05	1025	2.12E-05
44	43	1050	0.03135926	1050	0.03186538	1050	0.03222587	1050	0.03208364	1050	0.03174594	1050	1.38E-05	1050	2.09E-05
45	44	1075	0.03172093	1075	0.03232065	1075	0.03279014	1075	0.03262427	1075	0.03226846	1075	2.04E-05	1075	2.11E-05
46	45	1100	0.0324665	1100	0.03283939	1100	0.03333016	1100	0.0331352	1100	0.03276581	1100	2.60E-05	1100	2.15E-05
47	46	1125	0.03334952	1125	0.03343046	1125	0.03384293	1125	0.03361544	1125	0.0332372	1125	2.75E-05	1125	2.17E-05
48	47	1150	0.03406232	1150	0.03407734	1150	0.0343245	1150	0.03406407	1150	0.03368188	1150	2.64E-05	1150	2.16E-05
49	48	1175	0.03463005	1175	0.03474986	1175	0.03477098	1175	0.03448029	1175	0.03409919	1175	2.60E-05	1175	2.08E-05
50	49	1200	0.0353104	1200	0.03540899	1200	0.03517805	1200	0.0348641	1200	0.03448849	1200	2.66E-05	1200	1.93E-05
51	50	1225	0.03614514	1225	0.03601261	1225	0.03554197	1225	0.03521492	1225	0.03484925	1225	2.49E-05	1225	1.71E-05
52	51	1250	0.03687726	1250	0.03652219	1250	0.0365898	1250	0.03553144	1250	0.03518098	1250	1.92E-05	1250	1.41E-05
53	52	1275	0.03727731	1275	0.03690863	1275	0.03612687	1275	0.03581319	1275	0.03548329	1275	1.15E-05	1275	1.07E-05
54	53	1300	0.03737348	1300	0.03715171	1300	0.03634435	1300	0.03606015	1300	0.03575585	1300	4.84E-06	1300	6.97E-06
55	54	1325	0.03733185	1325	0.03724185	1325	0.0365117	1325	0.03627258	1325	0.03599842	1325	4.09E-07	1325	3.32E-06
56	55	1350	0.03726762	1350	0.03718039	1350	0.03663041	1350	0.03645111	1350	0.03621086	1350	-2.52E-06	1350	1.22E-08
57	56	1375	0.03722762	1375	0.0369841	1375	0.03670386	1375	0.03659646	1375	0.03639313	1375	-5.63E-06	1375	-2.61E-06
58	57	1400	0.03715083	1400	0.03669237	1400	0.03673697	1400	0.03670961	1400	0.03654527	1400	-1.07E-05	1400	-4.33E-06
59	58	1425	0.0368171	1425	0.03635285	1425	0.03673544	1425	0.03679156	1425	0.03666746	1425	-1.75E-05	1425	-4.94E-06
60	59	1450	0.03602707	1450	0.03602826	1450	0.03670638	1450	0.0368441	1450	0.03675995	1450	-2.18E-05	1450	-4.45E-06
61	60	1475	0.03498489	1475	0.03577984	1475	0.03665736	1475	0.03686914	1475	0.03682314	1475	-1.75E-05	1475	-3.00E-06



The Fragile Fiber1 Kinesin Contributes to Cortical Microtubule-Mediated Trafficking of Cell Wall Components¹[OPEN]

Chuanmei Zhu, Anindya Ganguly, Tobias I. Baskin, Daniel D. McClosky, Charles T. Anderson, Cliff Foster, Kristoffer A. Meunier, Ruth Okamoto, Howard Berg, and Ram Dixit*

Biology Department (C.Z., A.G., R.D.) and Department of Mechanical Engineering (R.O.), Washington University, St. Louis, Missouri 63130; Biology Department, University of Massachusetts, Amherst, Massachusetts 01003 (T.I.B.); Department of Biology and Center for Lignocellulose Structure and Formation, Pennsylvania State University, University Park, Pennsylvania 16802 (D.D.M., C.T.A.); Great Lakes Bioenergy Research Center, East Lansing, Michigan 48823 (C.F., K.A.M.); and Donald Danforth Plant Science Center, St. Louis, Missouri 63132 (H.B.)

ORCID ID: 0000-0001-7881-2859 (R.D.).

The cell wall consists of cellulose microfibrils embedded within a matrix of hemicellulose and pectin. Cellulose microfibrils are synthesized at the plasma membrane, whereas matrix polysaccharides are synthesized in the Golgi apparatus and secreted. The trafficking of vesicles containing cell wall components is thought to depend on actin-myosin. Here, we implicate microtubules in this process through studies of the kinesin-4 family member, Fragile Fiber1 (FRA1). In an *fra1-5* knockout mutant, the expansion rate of the inflorescence stem is halved compared with the wild type along with the thickness of both primary and secondary cell walls. Nevertheless, cell walls in *fra1-5* have an essentially unaltered composition and ultrastructure. A functional triple green fluorescent protein-tagged FRA1 fusion protein moves processively along cortical microtubules, and its abundance and motile density correlate with growth rate. Motility of FRA1 and cellulose synthase complexes is independent, indicating that FRA1 is not directly involved in cellulose biosynthesis; however, the secretion rate of fucose-alkyne-labeled pectin is greatly decreased in *fra1-5*, and the mutant has Golgi bodies with fewer cisternae and enlarged vesicles. Based on our results, we propose that FRA1 contributes to cell wall production by transporting Golgi-derived vesicles along cortical microtubules for secretion.

375	0.01119295	375	0.01165139
400	0.01192339	400	0.01238697
425	0.01267872	425	0.01314231
450	0.01345738	450	0.01391499
475	0.01425778	475	0.01470339
500	0.01507876	500	0.01550504
525	0.01591797	525	0.0163175
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625	0.01940391	625	0.01962673
650	0.02028949	650	0.02045728
675	0.02117208	675	0.02128503

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(Experiment)(Writing) = Science

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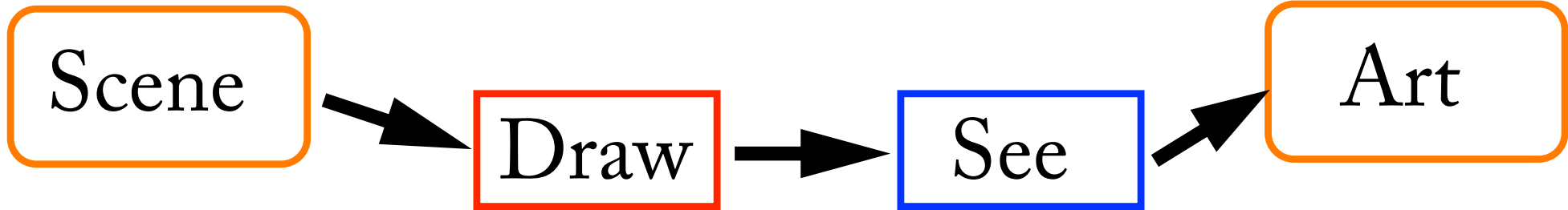
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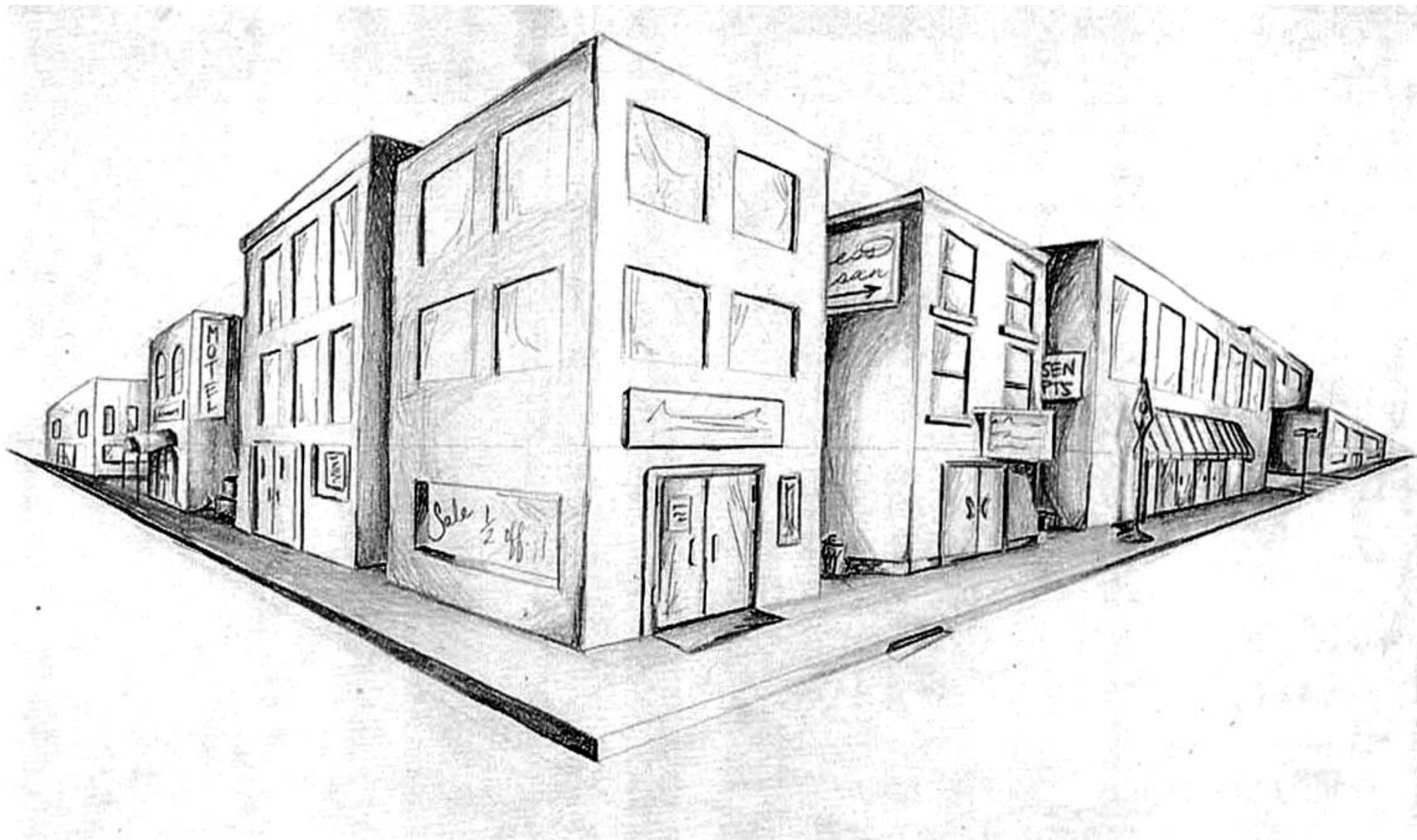
ORCID ID: 0000-0001-7881-2859 (R.D.).

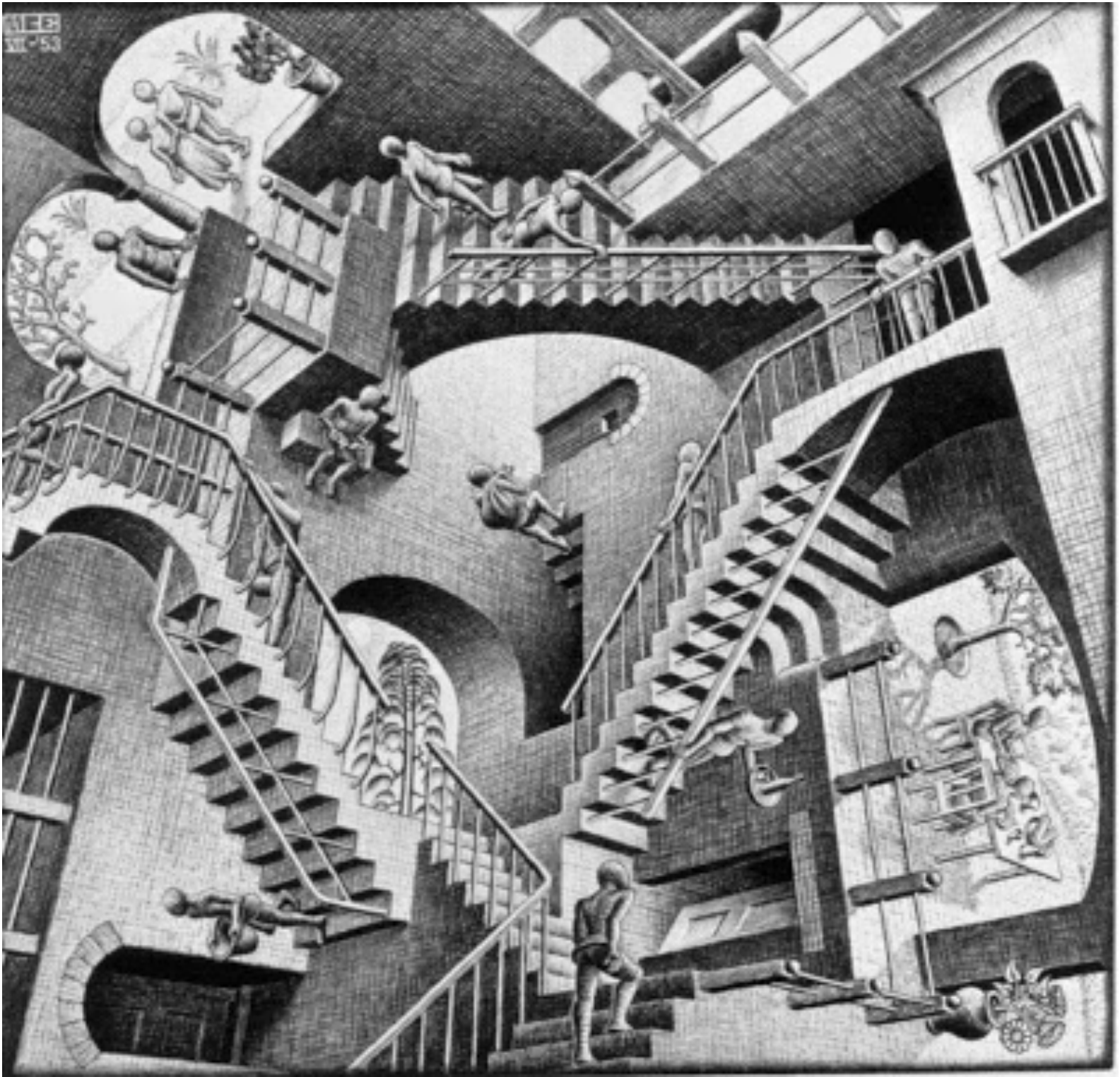
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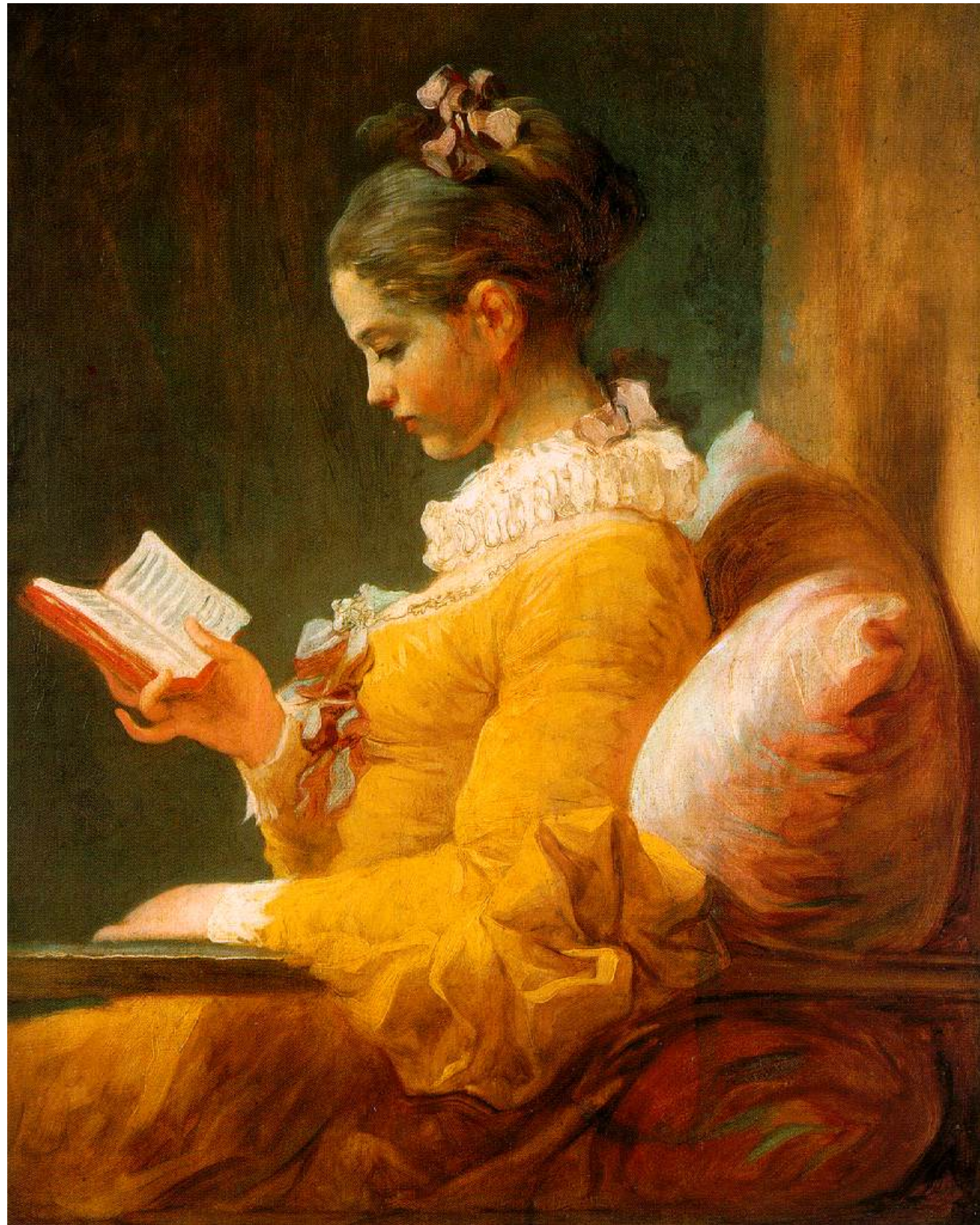








Mechanics of
reading
provide the
bases
for effective
writing



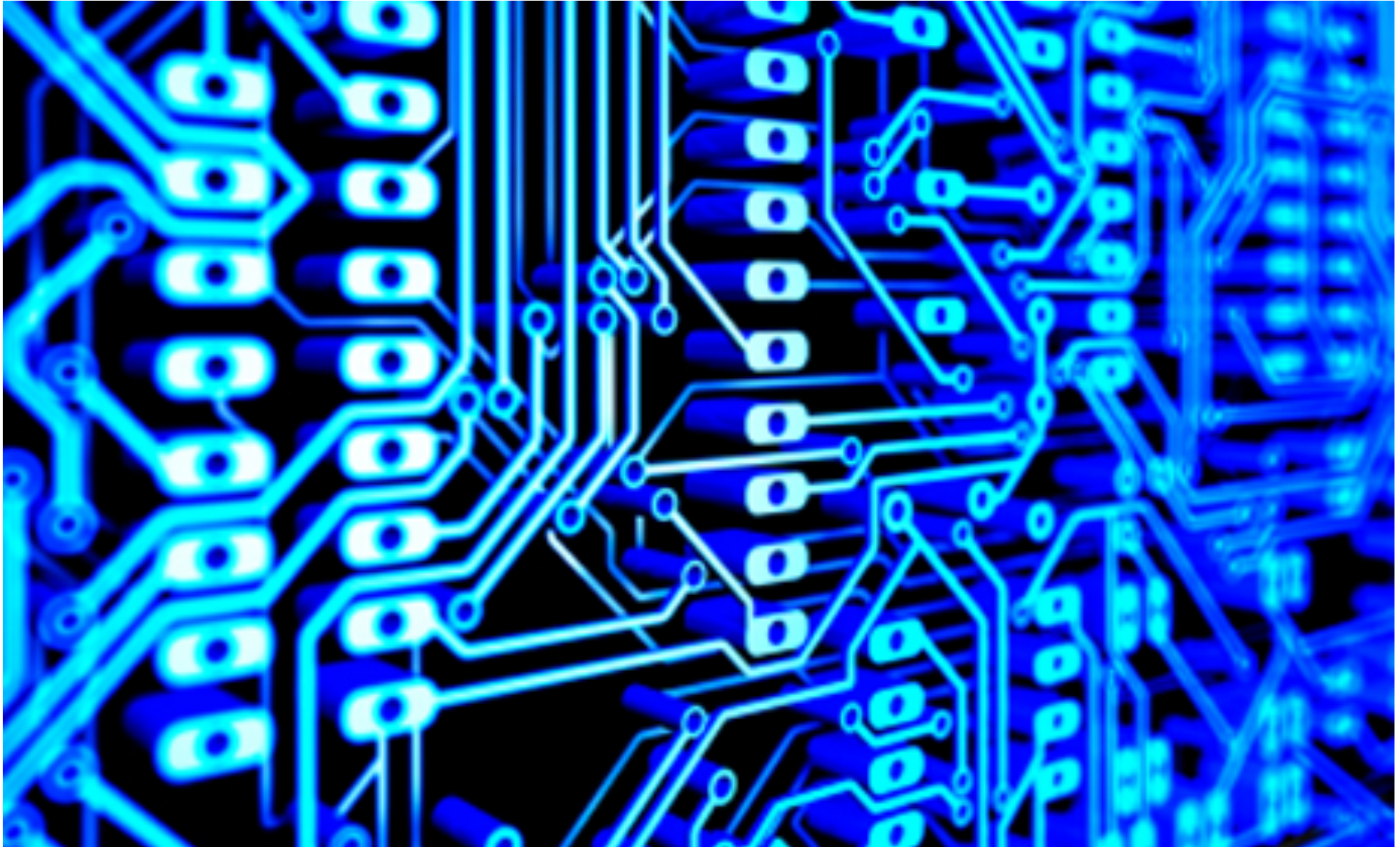
In engineering terms, tissue σ is an example of a residual σ . As such, putting the epidermis in σ has been shown to play an important role in enhancing the resistance of the stem to bending. Tissue σ is a stress integrated over (and acting upon) multiple cells, arising from large but fine-scale fluctuations of σ that occur at the sub-cellular level, and involving compression of protoplasts and σ in neighboring cell walls. At the level of a cell, tissue σ represents the net σ acting on that cell due to its neighbors; it disrupts the balance between cell wall σ and protoplast pressure that would occur were the cell to be isolated.

It was found that ET was higher in loamy soil than in sandy soil, under sufficient N supply than under low-N stress, and in rain-rich years than in rain shortage years. The higher ET in sufficient N supply compared to low-N stress resulted from the higher plant biomass but not leaf stomatal conductance and transpiration rate. There was a significant effect of year \times soil \times N on GY and WP_{grain} . The highest WP_{grain} was achieved in 2011 due to the lowest ET. Too much rainfall during seedling and silking stage did not benefit biomass accumulation and grain development, and potentially reduced WP_{grain} in 2012 and 2013. Maize grown in loamy soil had higher GY and WP_{grain} than in sandy soil.



Grammar

Information flow



I was awoken this morning around dawn by the unmistakable smell of skunk.

This morning around dawn, I was awoken by the unmistakable smell of skunk.

I was awoken by the unmistakable smell of skunk this morning around dawn.

This morning I was awoken by the unmistakable smell of skunk around dawn.

This morning around dawn, the unmistakable smell of skunk woke me.

This morning around dawn, a skunk woke me with its unmistakable smell.



Action

Agent

Recipient

Context

Extra

This morning around dawn, a skunk woke me with its unmistakable smell.





- Write English based on how English is read.
- Writing tells the story of your experiments.
- Stories involve agents and actions.
- Distinguish context from agents and action.
- Keep agent, action, recipient close together.



Four guides to clear writing



Gopen GD, Swan JA (1990) The science of scientific writing. *American Scientist* 78: 550 - 558.

<http://www.americanscientist.org/issues/pub/the-science-of-scientific-writing>

Williams JM

Style, Ten Lessons in Clarity and Grace.



1. Express actions in verbs



1. *Express actions in verbs*

The dancer has a leap.

The dancer leaps.



1. Express actions in verbs

The dancer has a leap.

Verb

Noun

The dancer leaps.



1. Express the *main* action in verbs

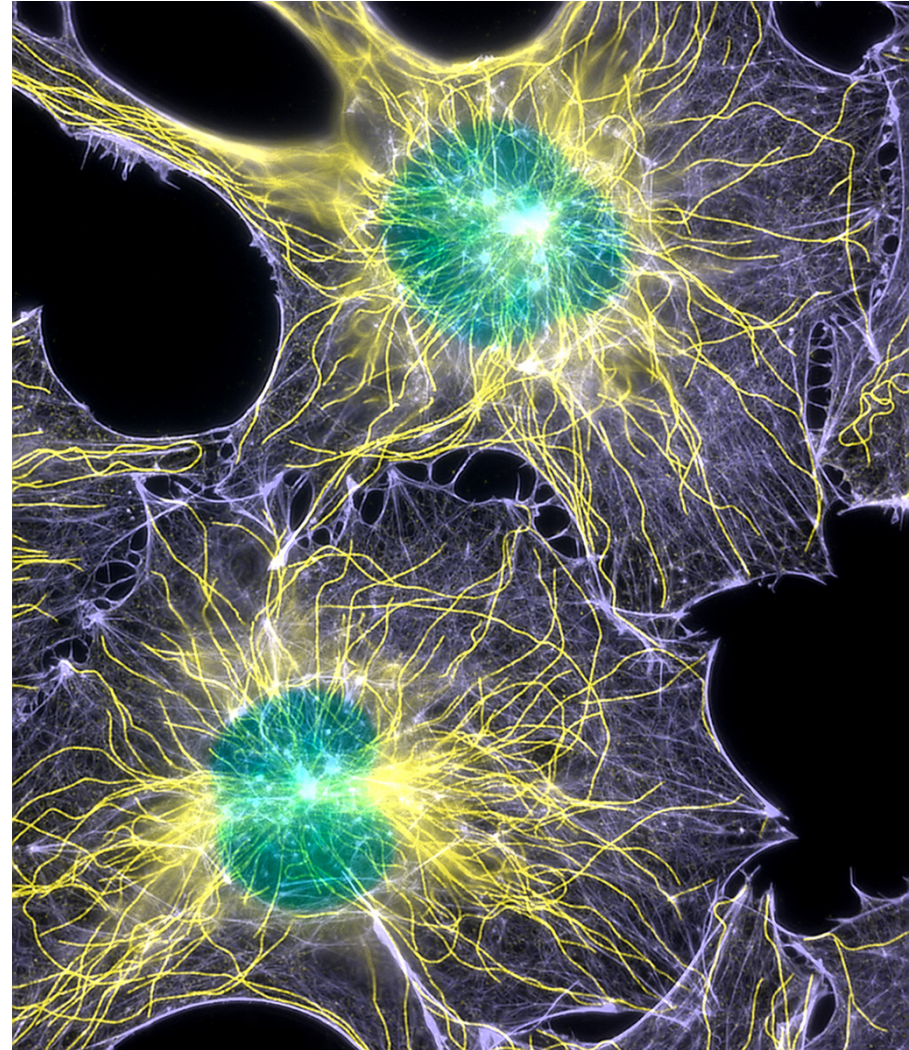
~~*The dancer has a leap.*~~

The dancer leaps.



1. Express the *main* action in verbs

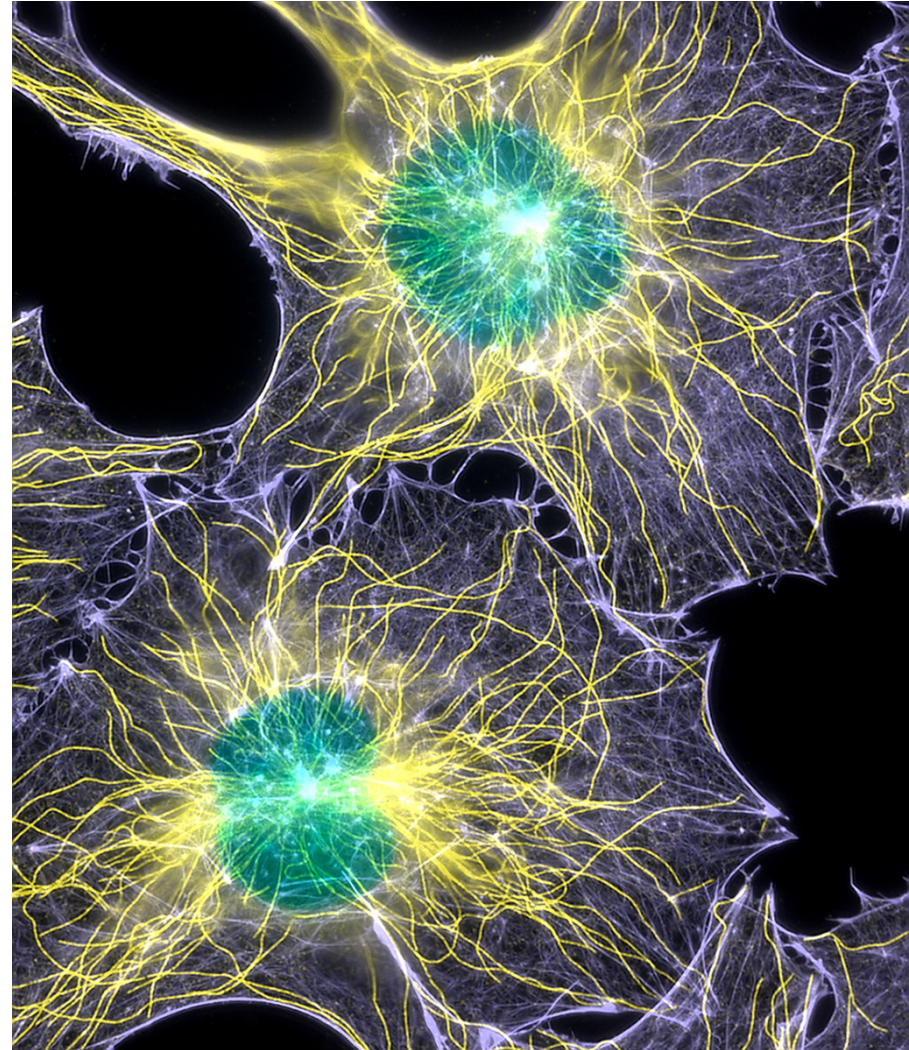
*The cells experienced
an increase
in respiration*



1. Express the *main* action in verbs

*The cells experienced
an increase
in respiration*

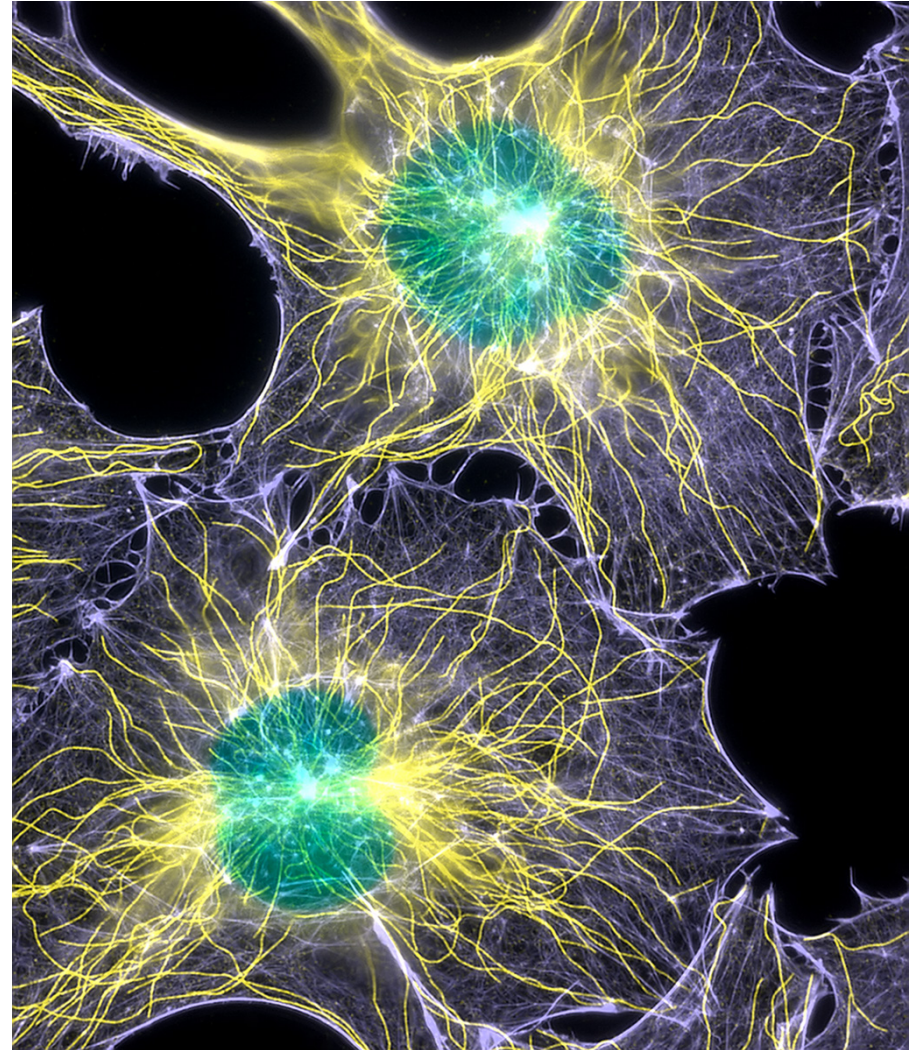
*The cells respired
more rapidly.*



1. Express the **main** action in verbs

~~The cells experienced
an increase
in respiration~~

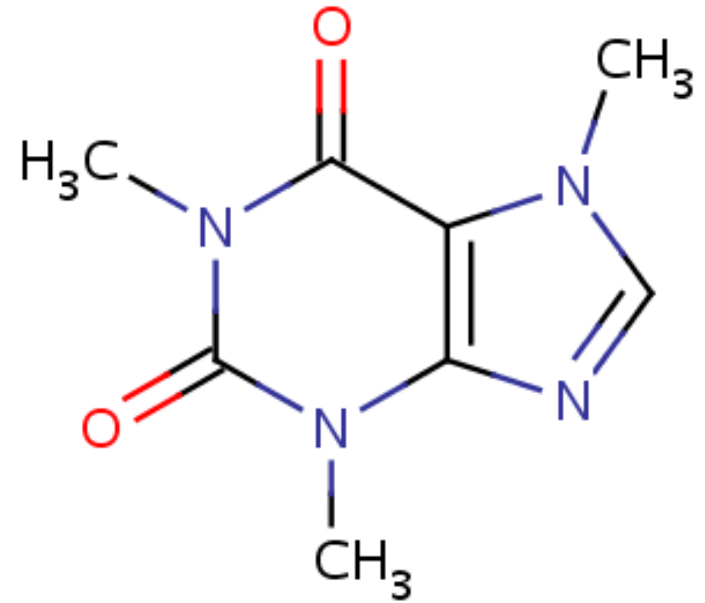
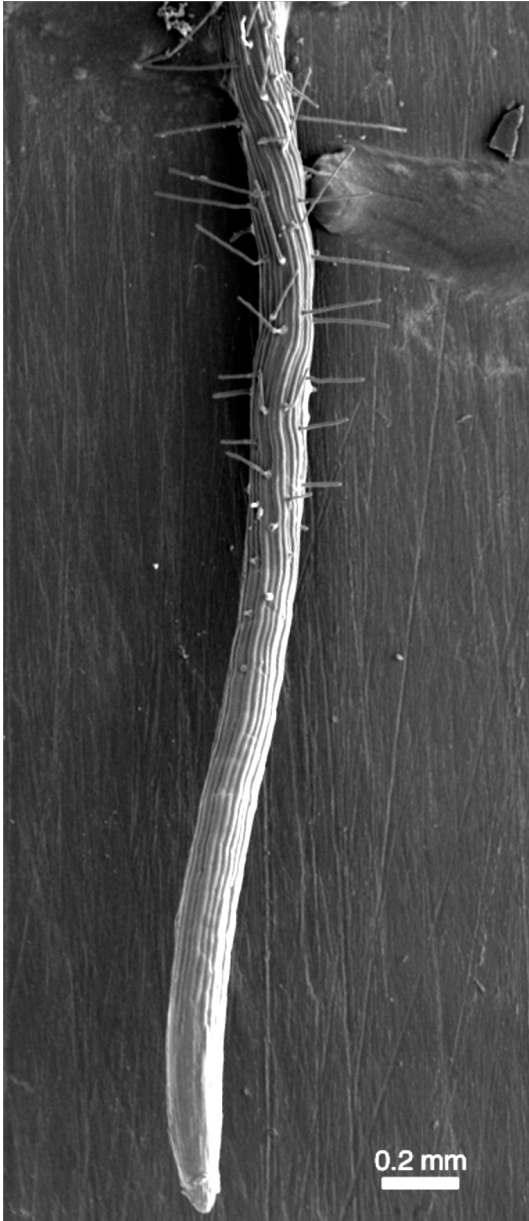
The cells respired
more rapidly.



2. Use characters as grammatical subjects



2. Use agents as grammatical subjects



Exposing wire to acid causes degradation.

subject

verb

object

Exposing wire to acid causes degradation.

recipient agent

action

subject

verb

object

Exposing wire to acid causes degradation.

recipient agent

action

Acid degrades wire.

subject

verb

object

Exposing wire to acid causes degradation.

recipient agent

action

subject verb object

Acid degrades wire.

agent action recipient

What about "I" and "We"



Its all about me!

equipment, and to Dr. G. E. R. Deacon and the captain and officers of R.R.S. *Discovery II* for their part in making the observations.

¹ Young, F. B., Gerrard, H., and Jevons, W., *Phil. Mag.*, **40**, 149 (1920).

² Longuet-Higgins, M. S., *Mon. Not. Roy. Astro. Soc., Geophys. Supp.*, **5**, 285 (1949).

³ Von Arx, W. S., *Woods Hole Papers in Phys. Oceanog. Meteor.*, **11** (3) (1950).

⁴ Ekman, V. W., *Arkiv. Mat. Astron. Fysik. (Stockholm)*, **2** (11) (1905).

MOLECULAR STRUCTURE OF NUCLEIC ACIDS

A Structure for Deoxyribose Nucleic Acid

WE wish to suggest a structure for the salt of deoxyribose nucleic acid (D.N.A.). This

We wish to put forward a radically different structure for the salt of deoxyribose nucleic acid. This structure has two helical chains each coiled round the same axis (see diagram). We have made the usual chemical assumptions, namely, that each

3. The start of the grammatical sentence is the topic



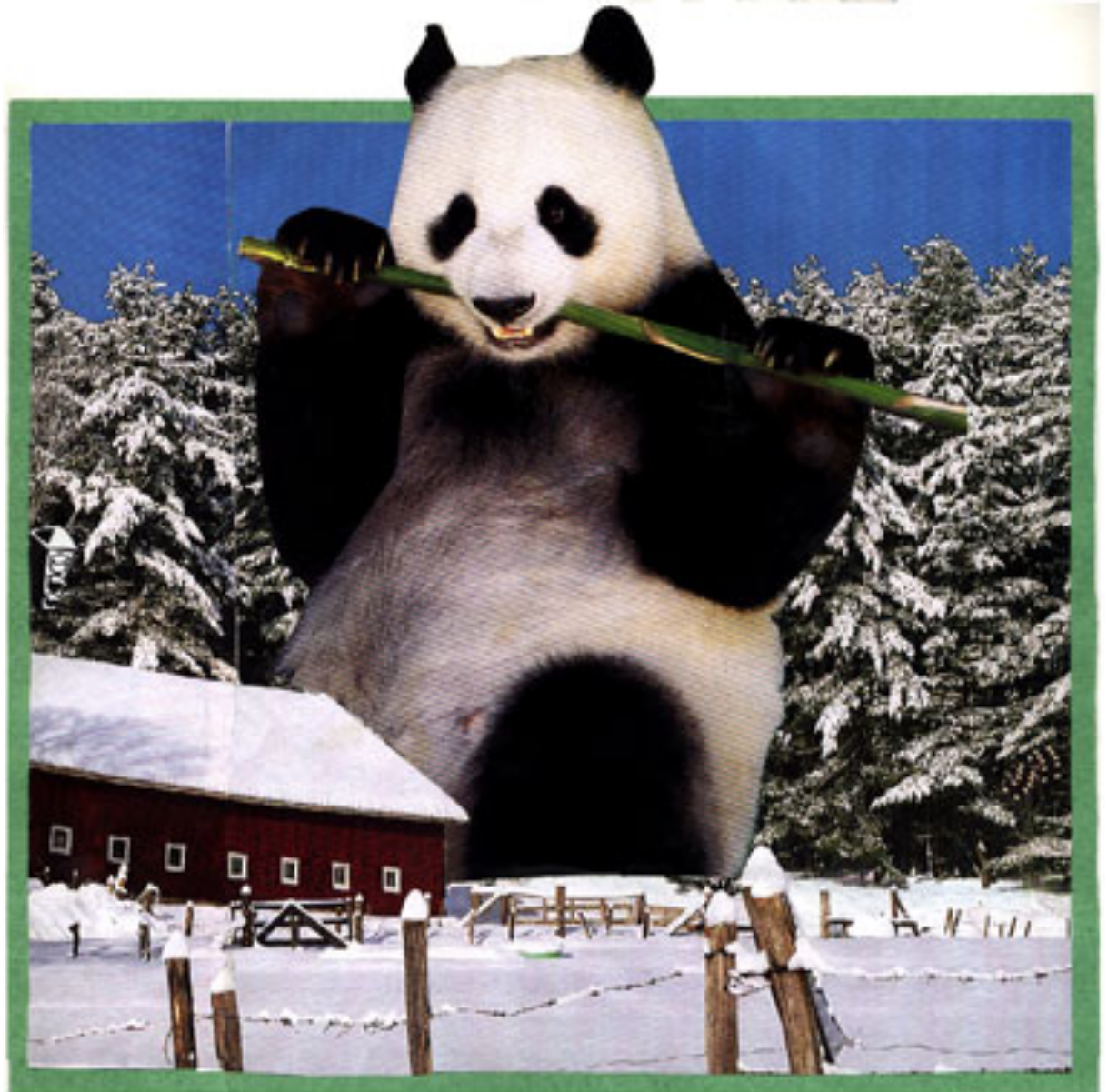


*The topic
is
what the
sentence is
about*

What is a clear sentence about?

- A doer (agent)
- Straightforward
- Short
- Readily comprehended
(linking back)

4. The end of the sentence is stressed



This morning around dawn, I was woken up by the pungent smell of a skunk.

This morning around dawn, I was woken up by the pungent smell of a skunk.

I was woken up by the pungent smell of a skunk at two AM.

What does a clear sentence stress?

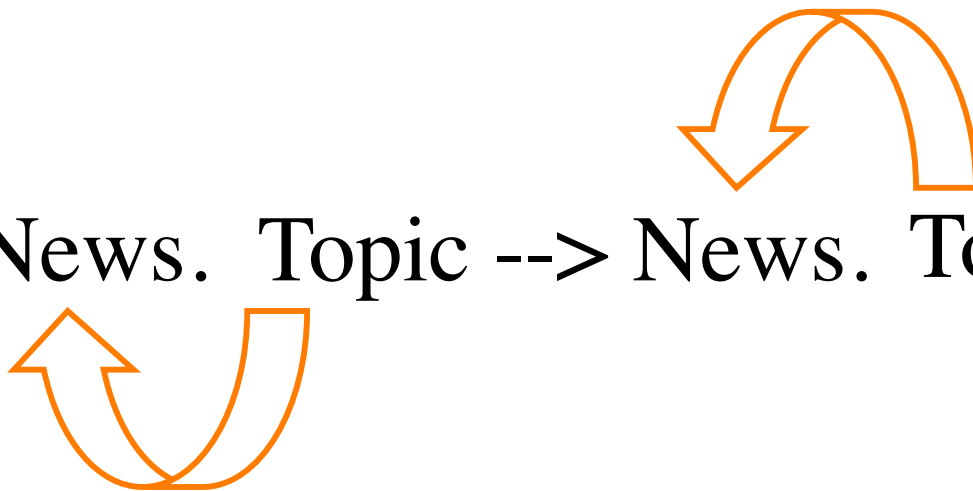
- Recipient (goal)
- Complex
- Exciting
- Memorable



Character ---> Action.

Topic ---> News.

Topic --> News. Topic --> News. Topic ---> News.



NEWS ==> TOPIC

???

The power to create and communicate a new message to fit a new experience is not a competence animals have in their natural states. Their genetic code limits the number and kind of messages that they can communicate. Information about distance, direction, source, and richness of pollen in flowers constitutes the only information that can be communicated by bees, for example. A limited repertoire of messages delivered in the same way, for generation after generation, is characteristic of animals of the same species, in all significant respects.

Animals are unable to create a new message to fit a new experience. Animal communication is limited by the genetic code, both in terms of the number and kind of messages. For example, bees can communicate information only about distance, direction, source, and richness of pollen in flowers. A given species delivers a limited repertoire of messages in the same way, generation after generation.

Animals are unable to create a new message to fit a new experience. **Animal communication** is limited by the genetic code, both in terms of the number and kind of messages. For example, **bees** can communicate information only about distance, direction, source, and richness of pollen in flowers. **A given species** delivers a limited repertoire of messages in the same way, generation after generation.

The power to create and communicate a new message to fit a new experience is not a competence animals have in their natural states. Their genetic code limits the number and kind of messages that they can communicate. Information about distance, direction, source, and richness of pollen in flowers constitutes the only information that can be communicated by bees, for example. A limited repertoire of messages delivered in the same way, for generation after generation, is characteristic of animals of the same species, in all significant respects.

Fixed

Topic

Stress

Variable

Short, simple,
familiar

New, long, complex

Variable

Character

Action

Fixed

Subject

Verb



- Express the main action in verbs.
- Use agents as grammatical subjects.
- The grammatical sentence starts with the topic.
- The end of the sentence is what is stressed.



write
write
write
write
write
write
write
write
write
write
write
write




Read (English!) fiction



SPEAKING





A photograph of a theater stage set. The stage is covered in a blue carpet. The backdrop is a painted scene of a blue sky with white clouds, framed by a series of arches. Two wooden chairs are positioned on the stage: one on the left side and one in the center foreground. The text "Your message here?" is overlaid in the center of the image. The stage is flanked by wooden side walls with vertical slats. In the foreground, the backs of several rows of dark wooden theater seats are visible.

Your message
here?

SPEAKING

- You are the show. Your slides are backdrop.



SPEAKING

- You are the show.
- Face the audience, always.



SPEAKING

- You are the show.
- Face the audience, always.
- Point wth your up-stage hand.



SPEAKING

- You are the show.
- Face the audience, always.
- Point with your up-stage hand.
- Mark beginning, middle, and end.



SPEAKING

- You are the show.
- Face the audience, always.
- Point with your up-stage hand.
- Mark beginning, middle, and end.
- Project a positive vibe.





X1F-1560990 - (c) - Keith Morris



Designing

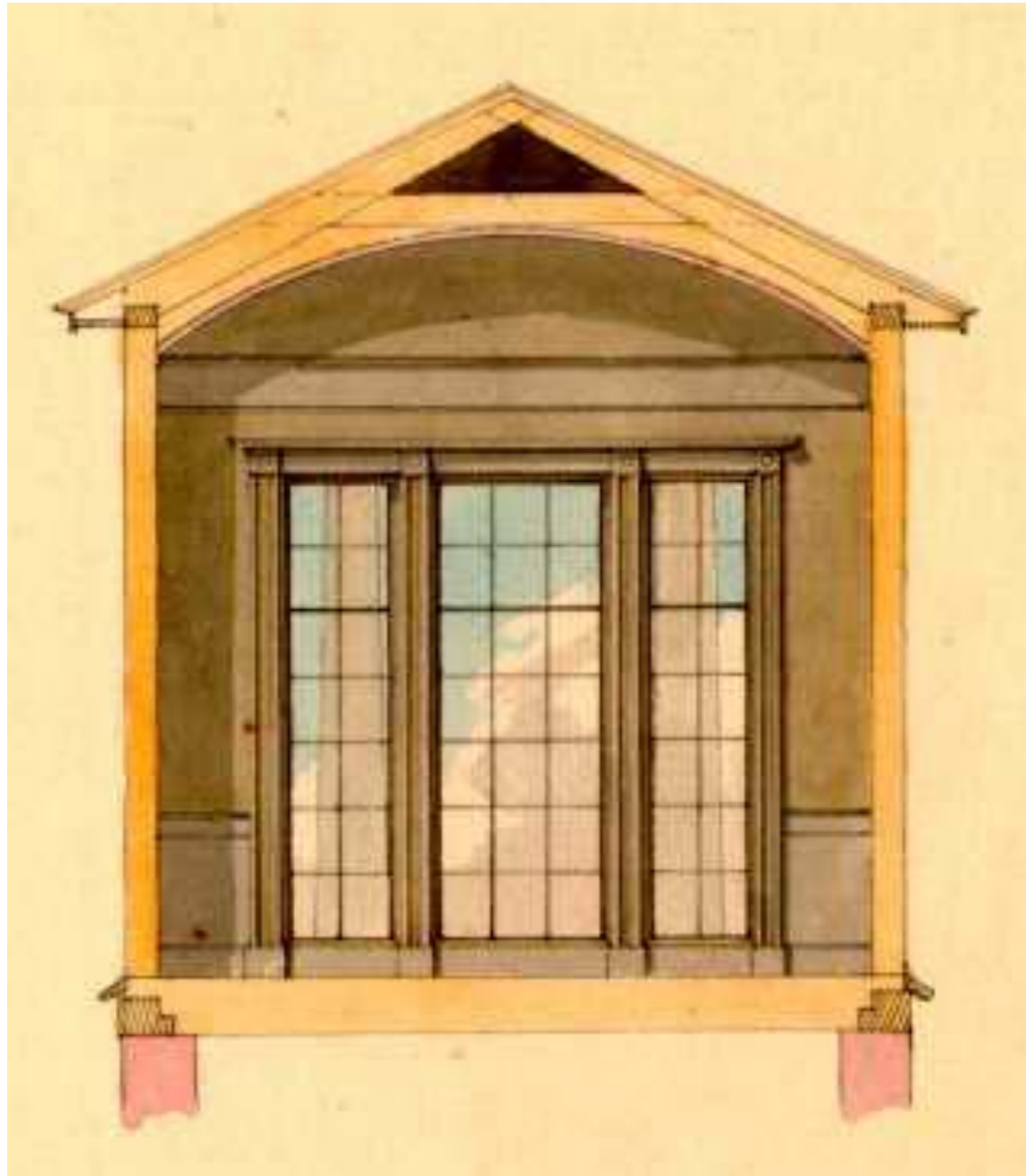
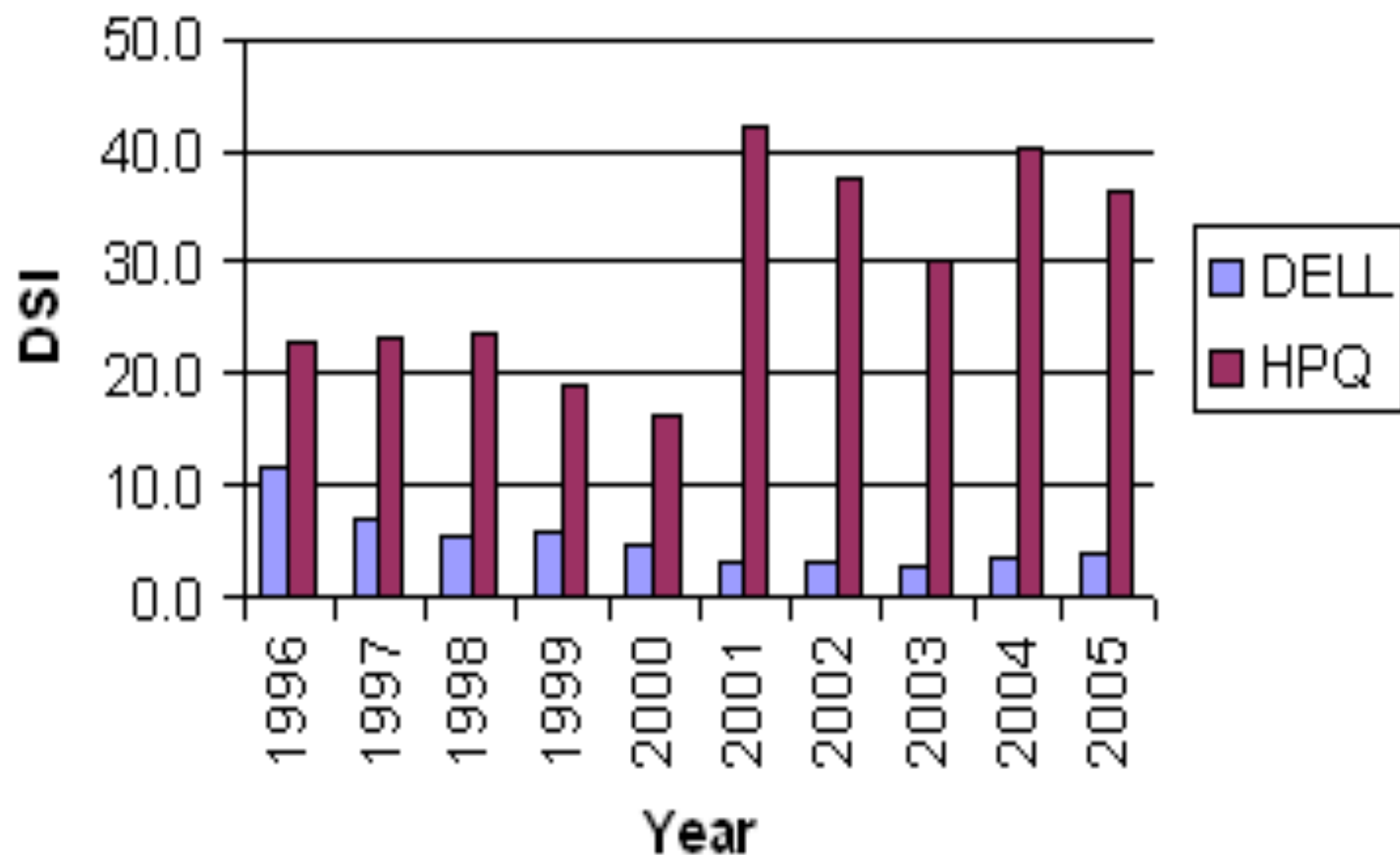
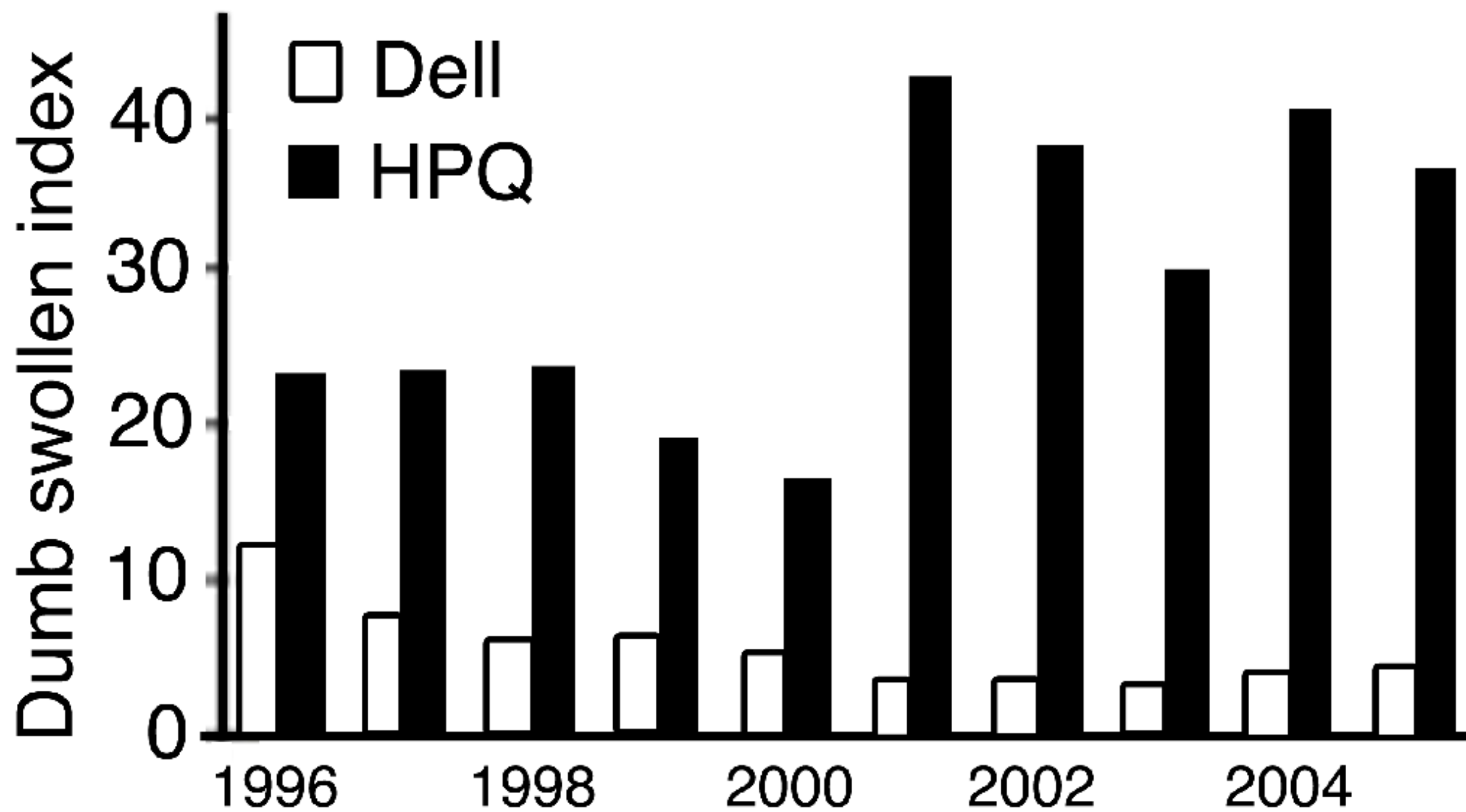
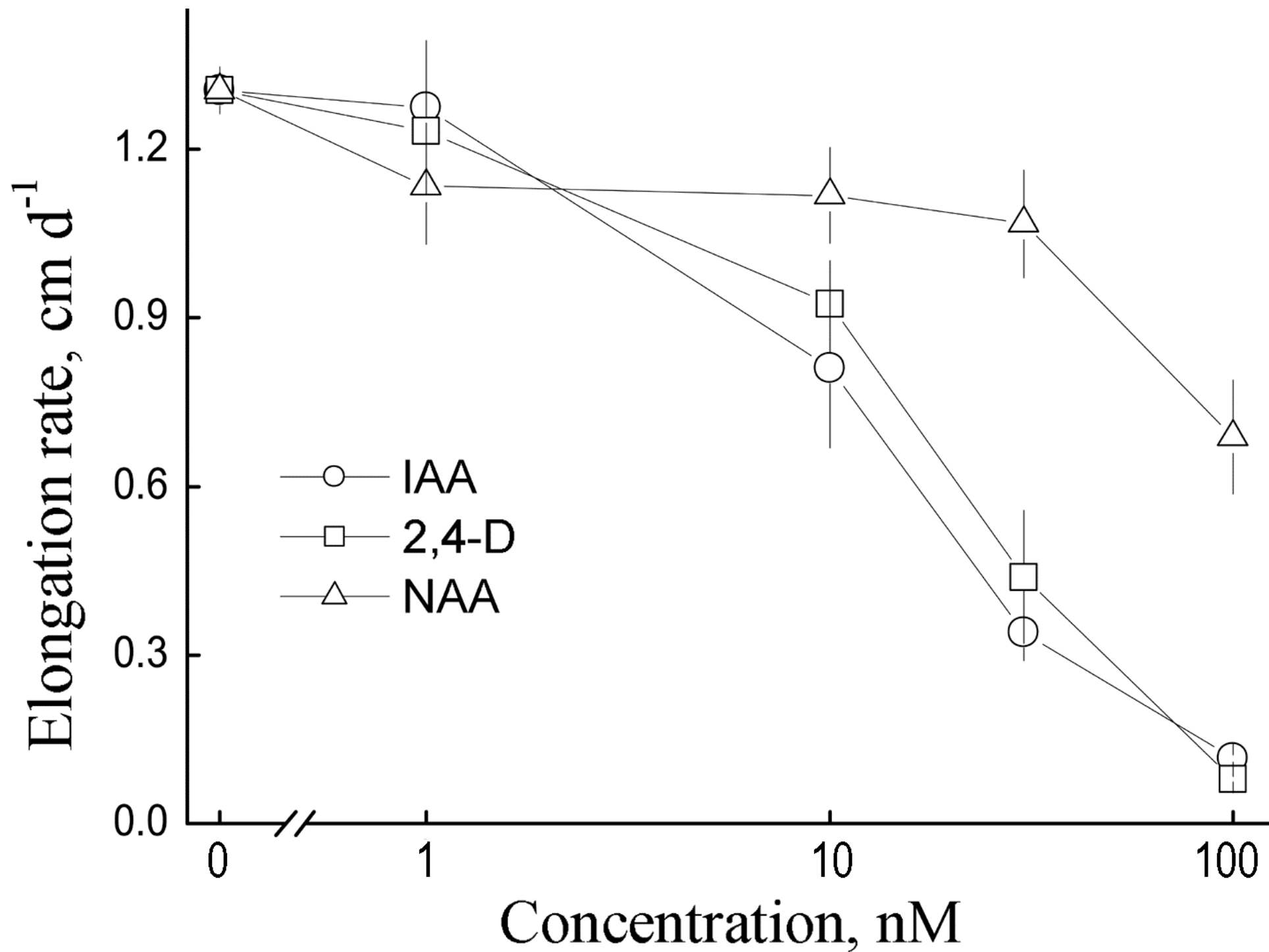
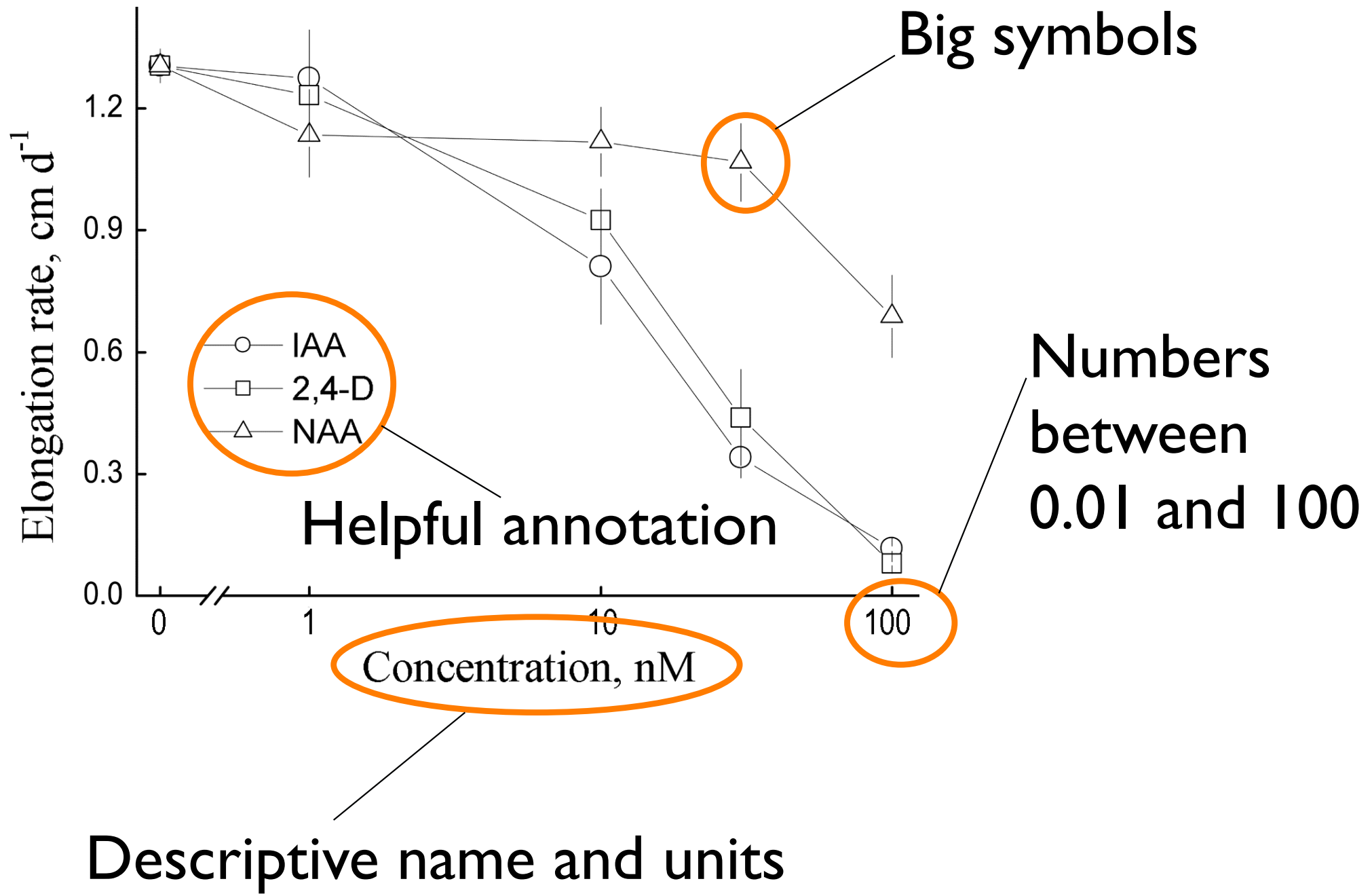


Figure 3: DSI Comparison



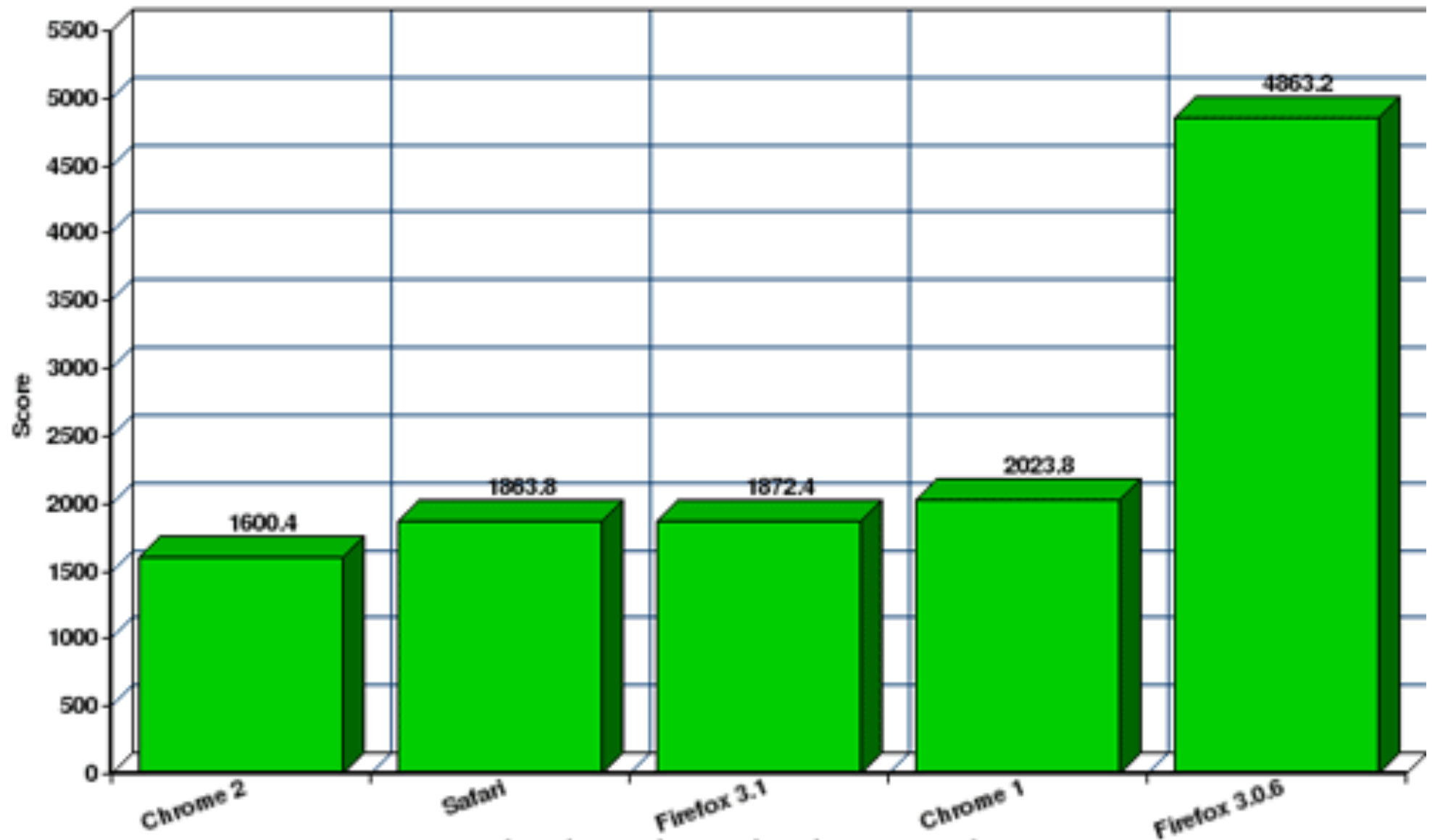








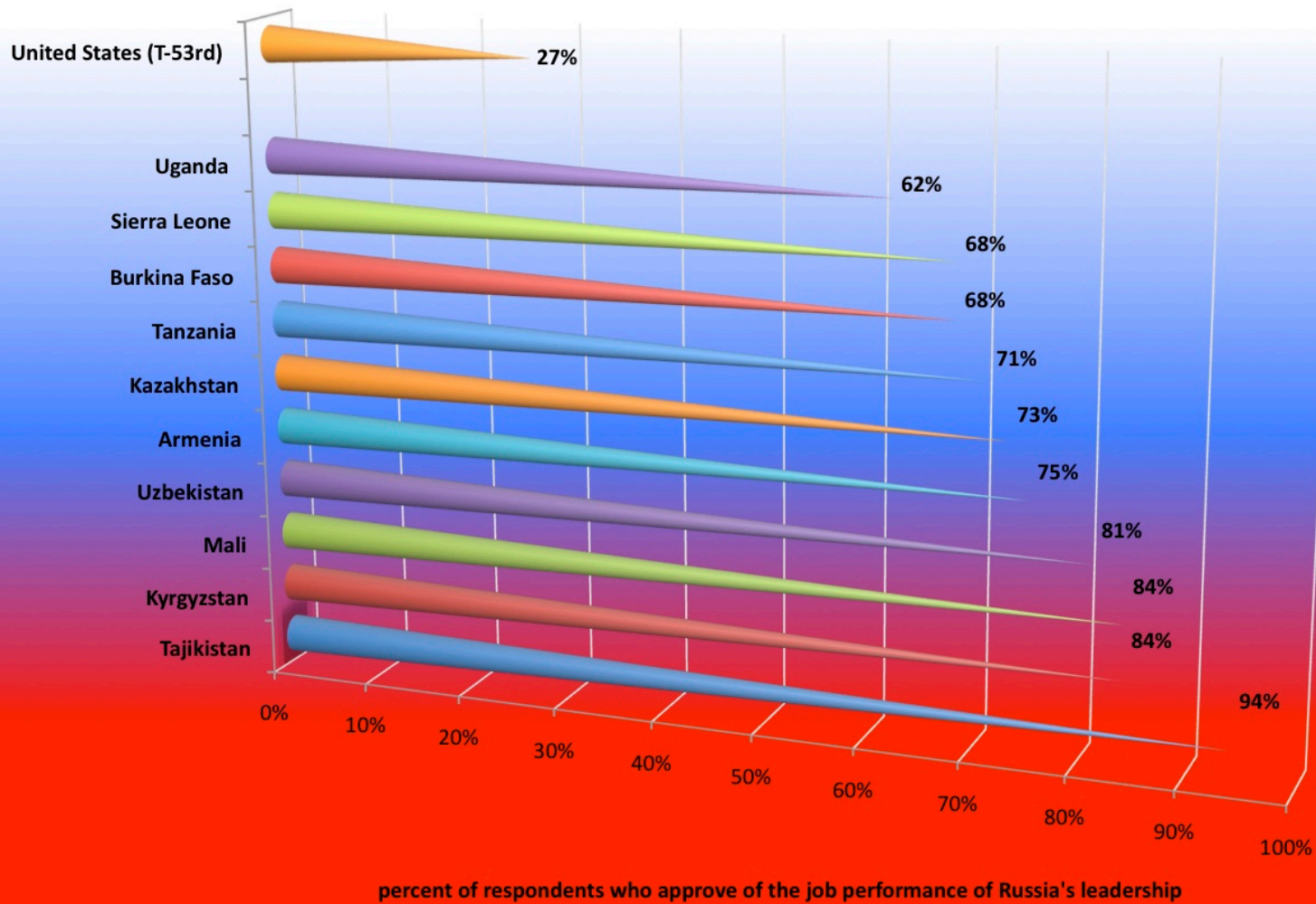
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| 3 | 16 |
| 4 | 17 |
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| 6 | 19 |
| 7 | 20 |
| 8 | 21 |
| 9 | 22 |
| 10 | 23 |
| 11 | 24 |
| 12 | 25 |
| 13 | 26 |



Sunspider benchmark - lower is better

Top Ten Countries in Approval of Russian Leadership, 2010

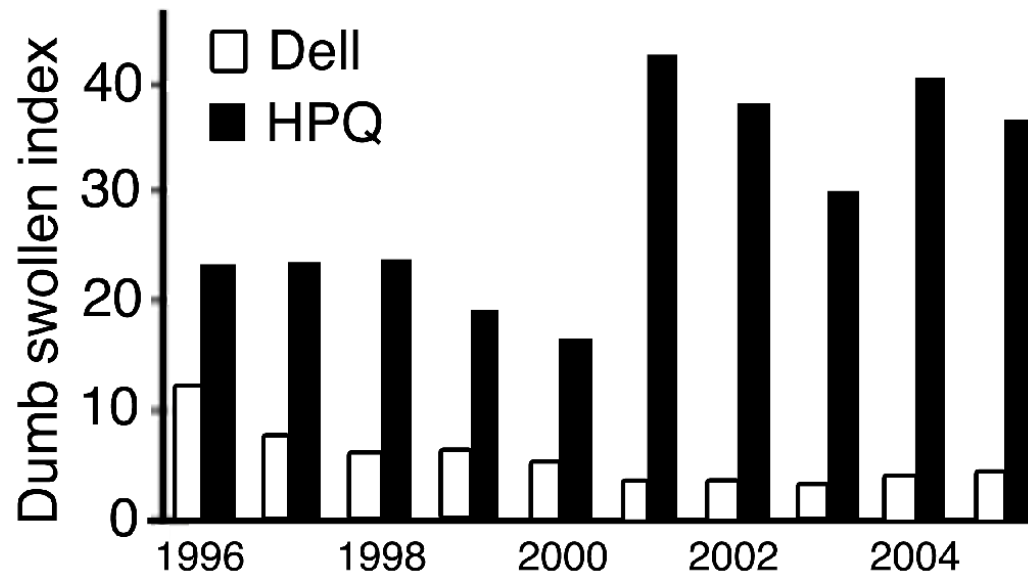
©2012 "Ranking America" (<http://rankingamerica.wordpress.com>)



Data from Gallup

<http://www.gallup.com/poll/128210/Gallup-Global-Reports.aspx>

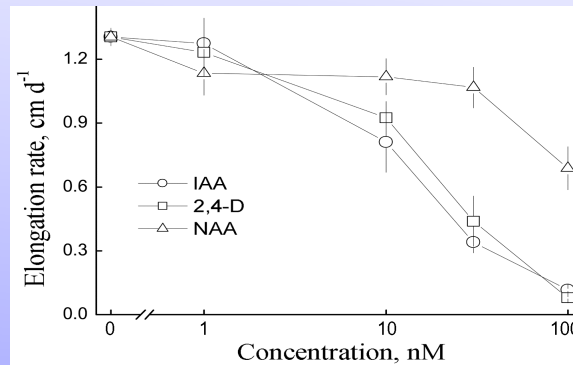
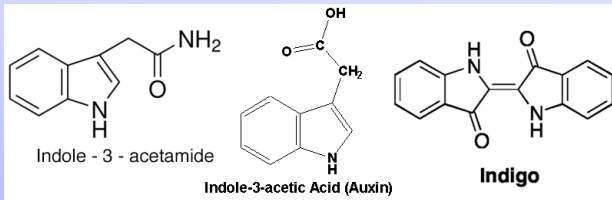
This format with a title up here and data below wastes space.





<http://www.hoylakejunction.com/friday-photo-busy-day-at-the-baths>

LOOK AT ALL MY FAR OUT COOL DATA!



AMAZING STUFF

- This is the induction of coolness provided that the square root of sausage = 5
- Intensification of the mean
- Auxin reveled to smoke in triplicate or quintuplicate.

BORING STUFF

- Peanut butter falsiification
- Lotus blossom shipping humongous containers
- Clams vote without rhyme or reason
- Lunch is a thing that makes the walrus scream

WACHSTUFF

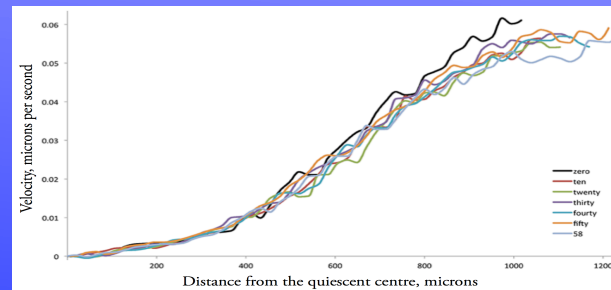
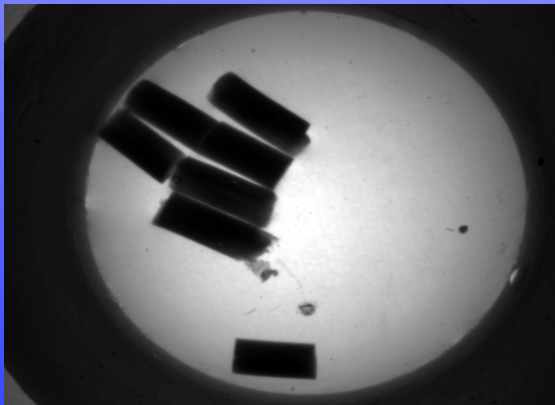
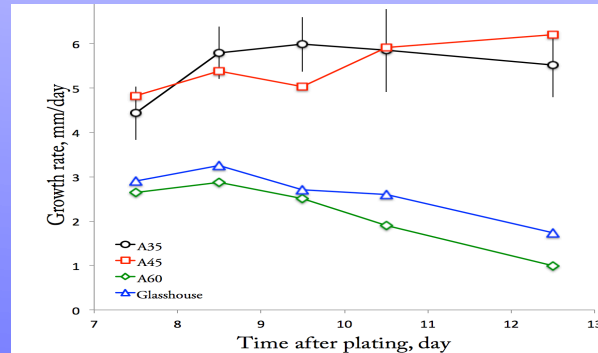
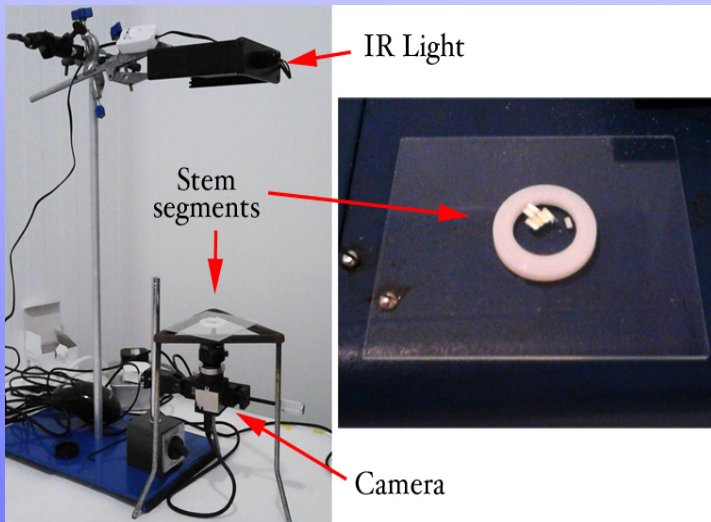
- This is the induction of coolness provided that the square root of sausage = 5
- Intensification of the mean
- Auxin reveled to smoke in triplicate or quintuplicate.

MADE YOU LOOK

- Peanut butter falsiification
- Lotus blossom shipping humongous containers
- Clams vote without rhyme or reason
- Lunch is a thing that makes the walrus scream

RHUBARB

- This is the induction of coolness provided that the square root of sausage = 5
- Intensification of the mean
- Auxin reveled to smoke in triplicate or quintuplicate.



DESIGNING

- Symbols and numbers easy to see.
- All ink is meaningful.
- Space used effectively.
- Shows the data, *not* the design.
- Avoid advertisements (no branding!).



