

Was there really a Hawthorne Effect at the Hawthorne Plant?
 An Analysis of the Original Illumination Experiments
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 Web Appendix

Regression Analysis of Experimentation with Lighting on Output

Appendix Table 1: Summary Statistics (All Rooms)

	<u>N</u>	<u>Mean</u>	<u>Std. Dev</u>	<u>Minimum</u>	<u>Maximum</u>
Output Level (Baseline = 100)					
Room 1	736	112.8	8.2	89.3	132.2
Room 2	372	108.7	6.9	84.5	127.3
Room 3	403	108.5	5.3	89.0	122.2
Total Level of Light (Foot-Candles)					
Room 1	495	22.2	17.7	1.4	70.0
Room 2	239	28.1	12.2	10.0	58.0
Room 3	113	24.1	16.8	5.0	56.0
Level of Artificial Light (Foot-Candles)					
Room 1	368	12.7	10.8	1.4	36.0
Room 2	112	17.3	11.9	4.0	36.0
Room 3	113	20.3	14.5	2.6	42.0
Level of Natural Light (Foot-Candles)					
Room 1	495	12.2	13.0	0.0	42.0
Room 2	239	18.2	11.2	0.0	42.0
Room 3	113	3.3	4.9	0.0	20.0

relative to the pre-experimentation baseline level of output normalized to equal 100. Total light and the breakdown between

Appendix Table 2: Additional Summary Statistics (Room 1)

	<u>Mean</u>	<u>Std. Dev</u>
Fraction of Days		
Experimenting with Light	0.50	0.50
Baseline Period	0.03	0.18
Day of Change	0.03	0.16
Day Before Holiday	0.02	0.13
Day After Holiday	0.02	0.14
Output checked Daily	0.03	0.17
Output checked 5x per Day	0.13	0.33
Defective Inputs	0.05	0.22
In West Workroom	0.07	0.26
Cloudy	0.47	0.50
Rain	0.08	0.27
Snow	0.03	0.18
Inches of rainfall	0.10	0.26

Notes: Data in table are daily summary statistics for Room 1. "Experimenting with light"

Appendix Table 3: Immediate Response of Output to Experimental Variation

	(1)	(2)	(3)
Day of Experimental Change	-1.021 (0.81)	-1.350 (0.80)	-1.282 (0.75)
One Day after Experimental Change	1.076 (0.80)	0.818 (0.79)	0.849 (0.74)
Two Days after Experimental Change	0.383 (0.80)	0.232 (0.79)	0.208 (0.74)
Three Days after Experimental Change	0.707 (0.83)	0.462 (0.82)	0.307 (0.77)
Four Days after Experimental Change	0.888 (0.81)	0.556 (0.80)	0.344 (0.76)
Five Days after Experimental Change	0.439 (0.81)	0.129 (0.80)	-0.051 (0.76)

N	0.025	(0.00)	0.065	(0.03)	0.052	(0.03)
N-squared/10,000	-0.034	(0.03)	-0.078	(0.30)	0.020	(0.28)
Total Light Recorded	0.078	(0.01)	0.040	(0.02)	0.006	(0.02)
Total Light Estimated	0.120	(0.02)	0.069	(0.03)	-0.048	(0.05)
Light Estimated (Dummy)	-0.501	(0.48)	-2.007	(0.77)	-0.167	(1.03)
High Temperature	-0.039	(0.01)	-0.043	(0.01)	-0.025	(0.01)
Cloudy	0.185	(0.24)	0.216	(0.24)	0.125	(0.22)
Rain	0.288	(0.46)	0.305	(0.45)	0.184	(0.42)
Snow	-0.898	(0.65)	-0.475	(0.64)	-0.417	(0.61)
Rainfall	0.483	(0.44)	0.078	(0.43)	-0.027	(0.41)
Day of Week						
Mon	3.686	(0.42)	3.659	(0.41)	3.660	(0.38)
Tues	5.567	(0.41)	5.492	(0.40)	5.504	(0.38)
Wed	5.683	(0.41)	5.671	(0.40)	5.681	(0.38)
Thurs	5.902	(0.41)	5.863	(0.40)	5.874	(0.38)
Fri	5.391	(0.41)	5.421	(0.40)	5.456	(0.38)
Month (December Omitted)						
Jan	3.336	(0.60)	3.650	(1.02)	3.051	(1.30)
Feb	3.347	(0.61)	-9.029	(6.54)	-0.112	(6.38)
Mar	4.401	(0.66)	1.670	(3.08)	2.159	(3.14)
April	4.060	(0.76)	1.441	(2.60)	1.811	(2.72)
May	1.951	(0.75)	-20.641	(11.28)	-13.425	(10.69)
June	0.320	(0.80)	-13.198	(7.67)	-5.408	(7.51)
July	-1.225	(0.82)	-4.734	(4.04)	-23.179	(11.65)
August	-0.943	(0.82)	-17.893	(8.24)	-10.584	(8.07)
September	-2.581	(0.86)	-8.409	(4.85)	-8.255	(4.71)
October	1.010	(0.93)	-19.777	(8.74)	-13.823	(8.38)
November	-1.196	(0.89)	-22.010	(9.01)	-15.714	(8.63)
Day Before Holiday	-0.094	(0.88)	-0.085	(0.86)	-0.011	(0.81)
Day After Holiday	-3.037	(0.88)	-2.718	(0.86)	-2.550	(0.81)
Workers in Different Room	-2.315	(0.83)	-25.259	(9.51)	-18.815	(9.11)
Defective inputs	-10.69	(0.79)	-10.603	(0.89)	-13.451	(1.33)
Output checked 1x daily	1.237	(1.00)	1.660	(1.05)	-1.033	(1.93)
Output checked 5x daily	-0.525	(0.61)	-0.522	(0.65)	-1.777	(1.85)
Room 2	-0.266	(0.34)	-0.389	(0.35)	0.823	(1.10)
Room 3	-1.084	(0.39)	-1.169	(0.40)	0.014	(1.10)
R-squared	0.69		0.71		0.75	
Includes Controls?	Yes		Yes		Yes	
Includes Month-Year Interactions?	No		Yes		Yes	
Includes Room-Month-Year Interactions?	No		No		Yes	

Notes: Entries in the table are the full regression results corresponding to those presented in Table 1.

Appendix Table 4: Long-Term Response of Output to Experimental Variation

	(1)	(2)	(3)
Pre-experimentation (Baseline)	-		-
Experimentation Ongoing	3.154	0.787	1.201
Experimentation Paused or Completed	-1.187	-4.992	2.743
N	0.023	0.059	0.045
N-squared/10,000	-0.019	-0.078	0.040
Total Light Recorded	0.070	0.025	0.006
Total Light Estimated	0.121	0.057	-0.061
Light Estimated (Dummy)	3.132	2.261	-1.130
High Temperature	-0.043	-0.039	-0.023
Cloudy	0.224	0.232	0.089
Rain	0.410	0.346	0.183
Snow	-0.916	-0.594	-0.589
Rainfall	0.488	0.068	-0.060
Day of Week			
Mon	3.421	3.481	3.475
Tues	5.578	5.599	5.595
Wed	5.631	5.707	5.700

Thurs	5.884	(0.38)	5.925	(0.37)	5.908	(0.35)
Fri	5.434	(0.38)	5.490	(0.37)	5.501	(0.35)
Month (December Omitted)						
Jan	1.524	(0.78)	3.405	(1.53)	2.189	(1.70)
Feb	1.881	(0.74)	-5.940	(6.42)	0.153	(6.29)
Mar	3.082	(0.76)	2.595	(3.09)	-1.216	(6.51)
April	2.927	(0.82)	2.367	(2.65)	1.157	(2.77)
May	1.000	(0.82)	-14.806	(11.12)	-13.547	(10.58)
June	-0.554	(0.86)	-9.498	(7.52)	-4.869	(7.37)
July	-2.068	(0.87)	-2.700	(3.99)	-23.457	(11.56)
August	-1.422	(0.89)	-13.774	(8.10)	-10.020	(7.92)
September	-3.472	(0.90)	-6.038	(4.78)	-8.880	(4.71)
October	-0.032	(0.97)	-16.674	(8.55)	-13.304	(8.22)
November	-2.028	(0.91)	-18.735	(8.83)	-2.274	(2.88)
Day Before Holiday	-0.354	(0.87)	-0.057	(0.86)	-0.109	(0.82)
Day After Holiday	-2.972	(0.87)	-2.656	(0.85)	-2.544	(0.81)
Workers in Different Room	-2.266	(0.82)	-22.149	(9.43)	-15.044	(5.60)
Defective inputs	-10.612	(0.79)	-10.992	(0.89)	-13.473	(1.33)
Output checked 1x daily	1.464	(1.00)	1.954	(1.04)	-1.384	(1.96)
Output checked 5x daily	-0.455	(0.60)	-0.156	(0.65)	-2.114	(1.89)
Room 2	-0.027	(0.35)	-0.047	(0.36)	0.808	(1.10)
Room 3	-1.024	(0.39)	-1.021	(0.40)	-0.002	(1.10)
R-squared	0.70		0.71		0.75	
Includes Controls?	Yes		Yes		Yes	
Includes Month-Year Interactions?	No		Yes		Yes	
Includes Room-Month-Year Interactions?	No		No		Yes	

Notes: Entries in the table are the full regression results corresponding to those presented in Table 2.

Appendix Table 5: Response of Output to Variations in the Level of Artificial versus Natural Light

	(1)		(3)		(3)	
Artificial Light	0.056	(0.02)	0.033	(0.02)	0.033	(0.02)
Natural Light	-0.045	(0.03)	-0.018	(0.03)	-0.021	(0.03)
N	0.061	(0.01)	0.075	(0.03)	0.075	(0.03)
N-squared/10,000	-0.558	(0.12)	-0.283	(0.38)	-0.282	(0.37)
High Temperature	-0.026	(0.01)	-0.024	(0.01)	-0.024	(0.01)
Cloudy	0.453	(0.29)	0.430	(0.29)	0.422	(0.28)
Rain	0.785	(0.58)	0.985	(0.58)	0.974	(0.56)
Snow	-0.853	(0.73)	-0.609	(0.73)	-0.604	(0.71)
Rainfall	0.088	(0.64)	-0.081	(0.63)	-0.089	(0.61)
Day of Week						
Mon	4.141	(0.47)	4.045	(0.47)	4.040	(0.45)
Tues	6.502	(0.46)	6.437	(0.46)	6.433	(0.45)
Wed	6.310	(0.46)	6.314	(0.46)	6.307	(0.44)
Thurs	6.740	(0.47)	6.707	(0.46)	6.703	(0.45)
Fri	6.183	(0.46)	6.191	(0.46)	6.191	(0.45)
Month (December Omitted)						
Jan	3.668	(0.58)	-18.740	(12.66)	-18.35	(12.3)
Feb	3.714	(0.62)	-10.253	(7.47)	-9.881	(7.26)
Mar	4.042	(0.80)	-20.091	(14.12)	-19.69	(13.7)
April	4.204	(0.91)	-5.383	(7.90)	-4.977	(7.68)
May	0.217	(1.02)	-2.905	(3.14)	-3.22	(3.14)
June	-1.988	(1.18)	-5.948	(3.71)	-6.571	(3.68)
July	-2.219	(1.22)	-6.808	(4.19)	-5.651	(4.14)
August	-2.653	(1.26)	-7.942	(4.63)	-5.06	(4.55)
September	-4.378	(1.16)	-20.618	(10.38)	-20.25	(10.1)
October	-0.877	(1.13)	-	-	-	-
November	-1.693	(0.87)	-20.157	(11.33)	-19.78	(11.0)
Day Before Holiday	-0.698	(1.04)	-0.882	(1.04)	-0.883	(1.01)
Day After Holiday	-4.372	(1.10)	-4.301	(1.10)	-4.277	(1.07)
Workers in Different Room	0.863	(1.22)	-	-	-	-
Defective Inputs	-12.95	(1.17)	-10.059	(2.20)	-10.06	(2.13)

Output checked 1x daily	-	-	-	-	-	-
Output checked 5x daily	-	-	-	-	-	-
Room 2	-0.17	(0.35)	-0.105	(0.35)	0.736	(1.04)
Room 3	-0.147	(0.51)	0.079	(0.51)	-0.136	(1.05)

R-squared	0.75	0.76	0.77
Includes Controls?	Yes	Yes	Yes
Includes Month-Year Interactions?	No	Yes	Yes
Includes Room-Month-Year Interactions?	No	No	Yes

Notes: Entries in the table are the full regression results corresponding to those presented in Table 3.