

Roast Level and Brew Temperature Significantly Affect the Color of Brewed Coffee

Yeager, Sara E.¹, Batali, Mackenzie E.¹, Lim Xian, Lik, Liang, Jiexin, Thompson, Ashley, Guinard, Jean-Xavier¹, Ristenpart, William D.¹
¹ University of California, Davis 1 Shields Ave, Davis, California, USA 95616

Introduction
 Beverage color significantly affects perceived sensory quality and consumer preference. Although the color of coffee beans is well known to vary strongly with roast level, little work has examined how roast level and brewing conditions affect the color of the final beverage. Here, we report that the color of full immersion brewed coffee is significantly affected by both roast level and brewing temperature.

Materials/Methods
 Coffees from three different origins were each roasted to three different levels (light, medium, and dark) and then brewed at three different temperatures (4° C, 22° C, and 92° C). Each sample was brewed towards full extraction and then diluted to precisely 2% total dissolved solids (TDS) so that differences in concentration would not confound color measurements. Absorbance spectra (UV-vis) and color tristimulus values (L*a*b*) were then collected and analyzed.

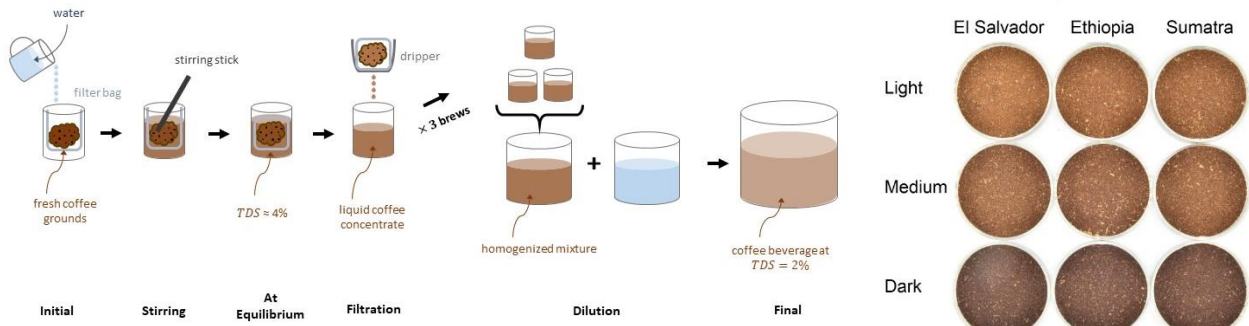


Figure 1: Diagram of Toddy-style full immersion brew process.



Results/Discussion
 We find that roast level had the strongest impact on brew color, and that brew temperature had a significant impact on color for light and medium roasts, with less impact on dark roasts. Qualitatively, the cold brewed coffees tended to be redder, while the hot brewed coffees were blacker. The results suggest that there is an opportunity to manipulate and brand brewed coffee color through judicious choices of roast level and brewing temperature.

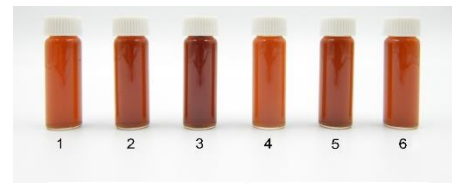


Figure 2 (top): True-color image of the coffee grounds used in this experiment
 Figure 4: True color images, using a natural white balance, of six representative brews placed as (left) 5 mL in glass vials or (bottom) 20 mL in white ceramic mugs. Number codes indicate: 1: ETH Light 92°C; 2: ELS Medium 92°C; 3: ELS Dark 92°C; 4: SUM Light 22°C; 5: ETH Medium 4°C; 6: SUM Dark 4°C.

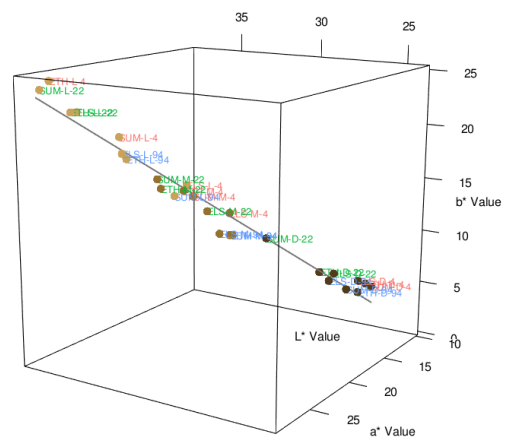
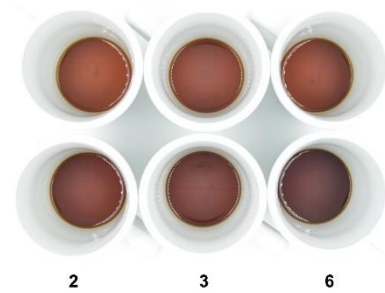


Figure 3: Three-dimensional plot of the L*a*b* values for each sample type grouped by roast and brew temperature. The black line denotes the linear best fit.



Conclusion/Perspectives
 The results suggest that there is an opportunity to manipulate and brand brewed coffee color through judicious choices of roast level and brewing temperature. Additionally, differential extraction of chemical species could be behind those color differences hinting at future research.

This paper is currently under review for publication.