# 统计学: 决策的科学项目说明

说明: 点此查看此文档的英文版本。

## 背景信息

在一个 Stroop (斯特鲁普)任务中,参与者得到了一列文字,每个文字都用一种油墨颜色展示。参与者的任务是将文字的打印颜色大声说出来。这项任务有两个条件:一致文字条件,和不一致文字条件。在一致文字条件中,显示的文字是与它们的打印颜色匹配的颜色词,如"红色"、"蓝色"。在不一致文字条件中,显示的文字是与它们的打印颜色不匹配的颜色词,如"紫色"、"橙色"。在每个情况中,我们将计量说出同等大小的列表中的墨色名称的时间。每位参与者必须全部完成并记录每种条件下使用的时间。

## 调查问题

作为一般说明,请确保记录你在创建项目时使用或参考的任何资源。作为项目提交的一部分,你将需要报告信息来源。

1. 我们的自变量是什么?因变量是什么?

自变量:文字条件是否一致性;

因变量:说出正确墨色名称的时间。

2. 此任务的适当假设集是什么? 你需要以文字和数学符号方式对假设集中的零假设和对立假设加以说明,并对数学符号进行定义。你想执行什么类型的统计检验? 为你的选择提供正当理由(比如,为何该实验满足你所选统计检验的前置条件)。

零假设  $H_0$  为: 说出正确墨色名称的时间 与 颜色词是否匹配上对应的油墨颜色 无关。  $\mu_{congruent} = \mu_{incongruent}$  ;

对立假设  $H_A$  为: 说出正确墨色的时间 与 颜色词是否匹配上对应的油墨颜色 有关。  $\mu_{congruent} \neq \mu_{incongruent}$  。

由于数据集中只有样本数据,样本量少,缺乏总体数据,所以执行 t 检验比较适合。 采用双尾检验。

现在轮到你自行尝试 Stroop 任务了。前往此链接,其中包含一个基于 Java 的小程序,专门用于执行 Stroop 任务。记录你收到的任务时间(你无需将时间提交到网站)。现在下载此数据集,其中包含一些任务参与者的结果。数据集的每行包含一名参与者的表现,第一个数字代表他们的一致任务结果,第二个数字代表不一致任务结果。

3. 报告关于此数据集的一些描述性统计。包含至少一个集中趋势测量和至少一个变异

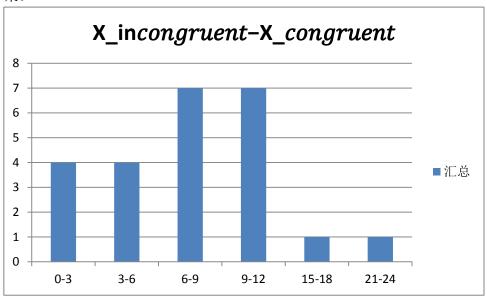
测量。

样本均值  $\bar{X}$  :  $\bar{X}_{congruent} = 14.05$ ,  $\bar{X}_{incongruent} = 22.02$ 

样本标准偏差 S: S<sub>congruent</sub> = 3.56, S<sub>congruent</sub> = 4.80

样本量 n:  $n_{congruent} = 24$ ,  $n_{incongruent} = 24$ ;

4. 提供显示样本数据分布的一个或两个可视化。用一两句话说明你从图中观察到的结果。



上图为X<sub>incongruent</sub> - X<sub>congruent</sub>的频数直方图可见图形正态分布。

5. 现在,执行统计测试并报告你的结果。你的置信水平和关键统计值是多少?你是否成功拒绝零假设?对试验任务得出一个结论。结果是否与你的期望一致?

均值差异  $\bar{X}_D$ :  $X_{incongruent} - X_{congruent} = 7.96$ 

自由度 df: df= $n_{congruent} + n_{incongruent}$ -2=46

样本误差 SE: 
$$\sqrt{\frac{S_{congruent}^2}{n} + \frac{S_{incongruent}^2}{n}} = 1.22$$

#### t 统计量:

t-statistic = 
$$\frac{X_{incongruent} - X_{congruent}}{SE}$$
 = 6.53

t-statistic = 
$$\frac{X_{congruent} - X_{incongruent}}{SE}$$
 = -6.53

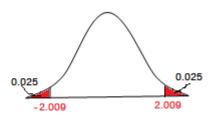
 $t=\pm 6.53$ 

#### t临界区:

设 $\alpha$ =0.05,由于采用双尾检验,则 p=0.025,依据 t 表,查出 df=46,p=0.025 ,对应的 t-critical= $\pm 2.009$ 

df     .25     .20     .15     .10     .05     .025     .02     .01     .005     .0025     .001     .0005       1     1.000     1.376     1.963     3.078     6.314     12.71     15.89     31.82     63.66     127.3     318.3     636.6       2     .816     1.061     1.386     1.886     2.920     4.303     4.849     6.965     9.925     14.02     22.33     3160       3     .765     .978     1.250     1.688     2.353     3.182     3.482     4.541     1.841     7.41     1.941     1.190     1.533     2.132     2.776     2.999     3.747     4.604     5.598     7.173     8.610       5     .727     .920     1.156     1.476     2.015     2.571     2.757     3.365     4.032     4.4773     5.893     6.869       6     .711     .896     1.119     1.415     1.895     2.365     2.517     2.938     3.499     4.029     4.785 <t< th=""><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></t<>													
2     .816     1.061     1.386     1.886     2.920     4.303     4.849     6.965     9.925     14.09     22.33     31.60       3     .765     .978     1.250     1.638     2.353     3.182     3.482     4.541     5.841     7.453     10.21     12.92       4     .741     .941     1.190     1.533     2.132     2.776     2.999     3.747     4.604     5.598     7.173     8.610       5     .727     .920     1.156     1.476     2.015     2.571     2.757     3.365     4.032     4.773     5.893     6.869       6     .718     .906     1.134     1.440     1.943     2.447     2.612     3.143     3.707     4.317     5.208     5.599       7     .711     .896     1.108     1.367     1.860     2.306     2.449     2.896     3.355     3.833     4.501     5.041       9     .703     .883     1.100     1.383     1.2262     2.398	df	.25	.20	.15	.10	.05	.025	.02	.01	.005	.0025	.001	.0005
2     .816     1.061     1.386     1.886     2.920     4.303     4.849     6.965     9.925     14.09     22.33     31.60       3     .765     .978     1.250     1.638     2.353     3.182     2.776     2.999     3.747     4.604     5.598     7.173     8.610       5     .727     .920     1.156     1.476     2.015     2.571     2.757     3.365     4.032     4.773     5.893     6.869       6     .718     .906     1.134     1.440     1.943     2.447     2.612     3.143     3.707     4.317     5.208     5.959       7     .711     .896     1.108     1.397     1.860     2.306     2.449     2.898     3.499     4.029     4.785     5.408       8     .706     .889     1.108     1.383     1.832     2.262     2.398     2.821     3.250     3.690     4.297     4.781       10     .700     .876     1.088     1.365     1.782	1	1.000	1.376	1.963	3.078	6.314	12.71	15.89	31.82	63.66	127.3	318.3	636.6
3     .765     .978     1.250     1.638     2.353     3.182     3.482     4.541     5.841     7.453     10.21     12.92       4     .741     .941     1.190     1.553     2.132     2.776     2.999     3.747     4.604     5.598     7.173     8.610       5     .727     .920     1.156     1.476     2.015     2.571     2.757     3.365     4.032     4.773     5.893     6.860       6     .718     .906     1.134     1.440     1.943     2.447     2.612     3.143     3.707     4.317     5.208     5.959       7     .711     .896     1.119     1.415     1.895     2.365     2.517     2.998     3.499     4.029     4.785     5.408       8     .706     .889     1.100     1.383     1.2262     2.398     2.821     3.250     3.834     4.501     4.781       10     .700     .876     1.088     1.363     1.796     2.201     2.328		.816	1.061	1.386	1.886	2.920	4.303	4.849	6.965	9.925	14.09	22.33	31.60
4     .741     .941     1.190     1.533     2.132     2.776     2.999     3.747     4.604     5.598     7.173     8.610       5     .727     .920     1.156     1.476     2.015     2.571     2.757     3.365     4.032     4.773     5.893     6.869       6     .718     .906     1.134     1.440     1.943     2.447     2.612     3.143     3.707     4.317     5.208     5.959       7     .711     .896     1.119     1.415     1.895     2.365     2.517     2.998     3.499     4.029     4.785     5.408       8     .706     .889     1.108     1.397     1.860     2.306     2.449     2.896     3.355     3.833     4.501     5.041       9     .703     .883     1.100     1.383     1.832     2.262     2.389     2.821     3.250     3.690     4.297     4.781       10     .700     .876     1.088     1.365     1.782     2.179	3	.765	.978			2.353	3.182	3.482	4.541	5.841	7.453		12.92
5     .727     .920     1.156     1.476     2.015     2.571     2.757     3.365     4.032     4.773     5.893     6.869       6     .718     .906     1.134     1.440     1.943     2.447     2.612     3.143     3.707     4.317     5.208     5.959       7     .711     .896     1.119     1.415     1.895     2.365     2.517     2.998     3.499     4.029     4.785     5.408       8     .706     .889     1.100     1.383     1.833     2.262     2.398     2.821     3.250     3.690     4.297     4.781       10     .700     .879     1.093     1.372     1.812     2.2281     3.259     2.764     3.169     3.497     4.025     4.437       11     .697     .876     1.088     1.363     1.796     2.201     2.338     2.718     3.106     3.497     4.025     4.437       12     .695     .873     1.083     1.356     1.782     2.179	4	.741				2.132	2.776		3.747	4.604	5.598	7.173	8.610
6     .718     .906     1.134     1.440     1.943     2.447     2.612     3.143     3.707     4.317     5.208     5.959       7     .711     .896     1.119     1.445     1.895     2.365     2.517     2.998     3.499     4.029     4.785     5.408       8     .706     .889     1.108     1.397     1.860     2.306     2.449     2.896     3.355     3.833     4.501     5.041       9     .703     .883     1.100     1.383     1.833     2.262     2.398     2.821     3.250     3.690     4.297     4.781       10     .700     .876     1.088     1.363     1.796     2.201     2.328     2.718     3.106     3.497     4.025     4.437       11     .697     .876     1.088     1.363     1.779     2.303     2.681     3.055     3.428     3.930     4.318       13     .694     .870     1.079     1.350     1.771     2.160     2.265	5	.727			1.476	2.015			3.365	4.032	4.773	5.893	6.869
8     .706     .889     1.108     1.397     1.860     2.306     2.449     2.896     3.355     3.833     4.501     5.041       9     .703     .883     1.100     1.383     1.833     2.262     2.398     2.821     3.250     3.690     4.297     4.781       10     .700     .879     1.093     1.372     1.812     2.228     2.359     2.764     3.169     3.497     4.025     4.437       11     .697     .876     1.088     1.363     1.796     2.201     2.328     2.718     3.106     3.497     4.025     4.437       12     .695     .873     1.083     1.356     1.771     2.160     2.282     2.650     3.012     3.372     3.852     4.221       14     .692     .868     1.076     1.345     1.761     2.145     2.264     2.624     2.977     3.326     3.787     4.140       15     .691     .866     1.074     1.341     1.753     2.131										3.707			5.959
8     .706     .889     1.108     1.397     1.860     2.306     2.449     2.896     3.355     3.833     4.501     5.041       9     .703     .883     1.100     1.383     1.833     2.262     2.398     2.821     3.250     3.690     4.297     4.781       10     .700     .879     1.093     1.372     1.812     2.228     2.359     2.764     3.169     3.497     4.025     4.437       11     .697     .876     1.088     1.363     1.796     2.201     2.328     2.718     3.106     3.497     4.025     4.437       12     .695     .873     1.083     1.356     1.771     2.160     2.282     2.650     3.012     3.372     3.852     4.221       14     .692     .868     1.076     1.345     1.761     2.145     2.264     2.624     2.977     3.326     3.783     4.073       16     .690     .865     1.071     1.337     1.746     2.120	7	.711	.896	1.119	1.415	1.895	2.365	2.517	2.998	3.499	4.029	4.785	5.408
9	8	.706	.889	1.108	1.397	1.860	2.306	2.449	2.896	3.355	3.833	4.501	5.041
10     .700     .879     1.093     1.372     1.812     2.228     2.359     2.764     3.169     3.581     4.144     4.587       11     .697     .876     1.088     1.363     1.796     2.201     2.328     2.718     3.106     3.497     4.025     4.437       12     .695     .873     1.083     1.356     1.782     2.179     2.303     2.681     3.055     3.428     3.930     4.318       13     .694     .870     1.079     1.350     1.771     2.160     2.282     2.650     3.012     3.372     3.852     4.221       14     .692     .868     1.076     1.345     1.761     2.145     2.262     2.947     3.286     3.783     4.073       15     .691     .866     1.071     1.337     1.746     2.120     2.235     2.583     2.921     3.252     3.686     4.015       17     .689     .863     1.069     1.333     1.734     2.101     2.214	9	.703	.883	1.100	1.383	1.833	2.262	2.398	2.821	3.250	3.690	4.297	
12   .695   .873   1.083   1.356   1.782   2.179   2.303   2.681   3.055   3.428   3.930   4.318     13   .694   .870   1.079   1.350   1.771   2.160   2.282   2.650   3.012   3.372   3.852   4.221     14   .692   .868   1.076   1.345   1.761   2.145   2.264   2.624   2.977   3.326   3.787   4.140     15   .691   .866   1.074   1.341   1.753   2.131   2.249   2.602   2.947   3.286   3.733   4.073     16   .690   .865   1.071   1.337   1.746   2.120   2.235   2.583   2.921   3.252   3.686   4.015     17   .689   .863   1.069   1.333   1.740   2.110   2.224   2.567   2.898   3.222   3.646   3.965     18   .688   .861   1.066   1.328   1.729   2.093   2.255   2.539   2.861   3.174   3.579   3.883     20 <td>10</td> <td>.700</td> <td>.879</td> <td>1.093</td> <td>1.372</td> <td>1.812</td> <td></td> <td>2.359</td> <td>2.764</td> <td>3.169</td> <td></td> <td>4.144</td> <td>4.587</td>	10	.700	.879	1.093	1.372	1.812		2.359	2.764	3.169		4.144	4.587
12   .695   .873   1.083   1.356   1.782   2.179   2.303   2.681   3.055   3.428   3.930   4.318     13   .694   .870   1.079   1.350   1.771   2.160   2.282   2.650   3.012   3.372   3.852   4.221     14   .692   .868   1.076   1.345   1.761   2.145   2.264   2.624   2.977   3.326   3.787   4.140     15   .691   .866   1.074   1.341   1.753   2.131   2.249   2.602   2.947   3.286   3.733   4.073     16   .690   .865   1.071   1.337   1.746   2.120   2.235   2.583   2.921   3.252   3.686   4.015     17   .689   .863   1.069   1.333   1.740   2.110   2.224   2.567   2.898   3.222   3.646   3.965     18   .688   .861   1.066   1.328   1.729   2.093   2.255   2.539   2.861   3.174   3.579   3.883     20 <td>11</td> <td>.697</td> <td>.876</td> <td>1.088</td> <td>1.363</td> <td>1.796</td> <td>2.201</td> <td>2.328</td> <td>2.718</td> <td>3.106</td> <td>3.497</td> <td>4.025</td> <td>4.437</td>	11	.697	.876	1.088	1.363	1.796	2.201	2.328	2.718	3.106	3.497	4.025	4.437
13     .694     .870     1.079     1.350     1.771     2.160     2.282     2.650     3.012     3.372     3.852     4.221       14     .692     .868     1.076     1.345     1.761     2.145     2.264     2.624     2.977     3.326     3.787     4.140       15     .691     .866     1.074     1.341     1.753     2.131     2.249     2.602     2.947     3.286     3.733     4.073       16     .690     .865     1.071     1.337     1.746     2.120     2.235     2.583     2.921     3.252     3.686     4.015       17     .689     .863     1.069     1.330     1.734     2.101     2.224     2.567     2.898     3.222     3.646     3.965       18     .688     .861     1.066     1.328     1.729     2.093     2.205     2.539     2.861     3.174     3.579     3.883       20     .687     .860     1.064     1.325     1.725     2.086	12	.695	.873		1.356	1.782	2.179	2.303	2.681	3.055	3.428		
15     .691     .866     1.074     1.341     1.753     2.131     2.249     2.602     2.947     3.286     3.733     4.073       16     .690     .865     1.071     1.337     1.746     2.120     2.235     2.583     2.921     3.252     3.686     4.015       17     .689     .863     1.069     1.333     1.740     2.110     2.224     2.567     2.898     3.222     3.646     3.965       18     .688     .862     1.067     1.330     1.734     2.101     2.214     2.552     2.878     3.197     3.611     3.922       19     .688     .861     1.066     1.328     1.729     2.003     2.205     2.539     2.861     3.174     3.579     3.883       20     .687     .860     1.064     1.323     1.721     2.086     2.197     2.528     2.845     3.153     3.552     3.850       21     .686     .858     1.061     1.321     1.717     2.074	13	.694	.870	1.079	1.350	1.771	2.160	2.282	2.650		3.372	3.852	4.221
15     .691     .866     1.074     1.341     1.753     2.131     2.249     2.602     2.947     3.286     3.733     4.073       16     .690     .865     1.071     1.337     1.746     2.120     2.235     2.583     2.921     3.252     3.686     4.015       17     .689     .863     1.069     1.333     1.740     2.110     2.224     2.567     2.898     3.222     3.646     3.965       18     .688     .862     1.067     1.330     1.734     2.101     2.214     2.552     2.878     3.197     3.611     3.922       19     .688     .861     1.066     1.328     1.729     2.003     2.205     2.539     2.861     3.174     3.579     3.883       20     .687     .860     1.064     1.323     1.721     2.086     2.197     2.528     2.845     3.153     3.552     3.850       21     .686     .858     1.061     1.321     1.717     2.074	14	.692	.868	1.076	1.345	1.761	2.145	2.264	2.624	2.977	3.326	3.787	4.140
17     .689     .863     1.069     1.333     1.740     2.110     2.224     2.567     2.898     3.222     3.646     3.965       18     .688     .862     1.067     1.330     1.734     2.101     2.214     2.552     2.878     3.197     3.611     3.922       19     .688     .861     1.066     1.328     1.729     2.093     2.205     2.539     2.861     3.174     3.579     3.883       20     .687     .860     1.064     1.325     1.725     2.086     2.197     2.528     2.845     3.153     3.552     3.850       21     .686     .859     1.063     1.323     1.721     2.080     2.189     2.518     2.831     3.135     3.527     3.819       22     .686     .858     1.061     1.321     1.717     2.074     2.183     2.508     2.819     3.119     3.505     3.792       23     .685     .858     1.060     1.318     1.711     2.064	15	.691	.866		1.341	1.753	2.131	2.249	2.602	2.947	3.286	3.733	4.073
18     .688     .862     1.067     1.330     1.734     2.101     2.214     2.552     2.878     3.197     3.611     3.922       19     .688     .861     1.066     1.328     1.729     2.093     2.205     2.539     2.861     3.174     3.579     3.883       20     .687     .860     1.064     1.325     1.725     2.086     2.197     2.528     2.845     3.153     3.552     3.850       21     .686     .859     1.063     1.323     1.721     2.080     2.189     2.518     2.831     3.135     3.527     3.819       22     .686     .858     1.061     1.321     1.717     2.074     2.183     2.508     2.819     3.119     3.505     3.792       23     .685     .858     1.060     1.319     1.714     2.069     2.177     2.500     2.807     3.104     3.485     3.768       24     .685     .857     1.059     1.318     1.711     2.064				1.071		1.746							
19     .688     .861     1.066     1.328     1.729     2.093     2.205     2.539     2.861     3.174     3.579     3.883       20     .687     .860     1.064     1.325     1.725     2.086     2.197     2.528     2.845     3.153     3.552     3.850       21     .686     .859     1.063     1.323     1.721     2.080     2.189     2.518     2.831     3.135     3.527     3.819       22     .686     .858     1.061     1.321     1.717     2.074     2.183     2.508     2.819     3.119     3.505     3.792       23     .685     .858     1.060     1.319     1.714     2.069     2.177     2.500     2.807     3.104     3.485     3.768       24     .685     .857     1.059     1.318     1.711     2.064     2.172     2.492     2.797     3.091     3.467     3.745       25     .684     .856     1.058     1.315     1.706     2.056		.689	.863	1.069			2.110						
20     .687     .860     1.064     1.325     1.725     2.086     2.197     2.528     2.845     3.153     3.552     3.850       21     .686     .859     1.063     1.323     1.721     2.080     2.189     2.518     2.831     3.135     3.527     3.819       22     .686     .858     1.061     1.321     1.717     2.074     2.183     2.508     2.819     3.119     3.505     3.792       23     .685     .858     1.060     1.319     1.714     2.069     2.177     2.500     2.807     3.104     3.485     3.768       24     .685     .857     1.059     1.318     1.711     2.064     2.172     2.492     2.797     3.091     3.467     3.745       25     .684     .856     1.058     1.315     1.708     2.060     2.167     2.485     2.787     3.078     3.450     3.725       26     .684     .855     1.057     1.314     1.703     2.052													
21     .686     .859     1.063     1.323     1.721     2.080     2.189     2.518     2.831     3.135     3.527     3.819       22     .686     .858     1.061     1.321     1.717     2.074     2.183     2.508     2.819     3.119     3.505     3.792       23     .685     .858     1.060     1.319     1.714     2.069     2.177     2.500     2.807     3.104     3.485     3.768       24     .685     .857     1.059     1.318     1.711     2.064     2.172     2.492     2.797     3.091     3.467     3.745       25     .684     .856     1.058     1.316     1.708     2.060     2.167     2.485     2.787     3.078     3.450     3.725       26     .684     .856     1.058     1.314     1.703     2.052     2.158     2.479     2.779     3.067     3.421     3.690       28     .683     .855     1.056     1.313     1.701     2.048	19	.688	.861	1.066	1.328		2.093			2.861	3.174		3.883
22     .686     .858     1.061     1.321     1.717     2.074     2.183     2.508     2.819     3.119     3.505     3.792       23     .685     .858     1.060     1.319     1.714     2.069     2.177     2.500     2.807     3.104     3.485     3.768       24     .685     .857     1.059     1.318     1.711     2.064     2.172     2.492     2.797     3.091     3.467     3.745       25     .684     .856     1.058     1.316     1.708     2.060     2.167     2.485     2.787     3.078     3.450     3.725       26     .684     .856     1.058     1.311     1.706     2.056     2.162     2.479     2.779     3.067     3.435     3.707       27     .684     .855     1.057     1.314     1.703     2.052     2.158     2.473     2.771     3.057     3.421     3.690       28     .683     .854     1.055     1.311     1.699     2.045		.687	.860	1.064		1.725	2.086	2.197		2.845	3.153		3.850
23     .685     .858     1.060     1.319     1.714     2.069     2.177     2.500     2.807     3.104     3.485     3.768       24     .685     .857     1.059     1.318     1.711     2.064     2.172     2.492     2.797     3.091     3.467     3.745       25     .684     .856     1.058     1.316     1.708     2.060     2.167     2.485     2.787     3.078     3.450     3.725       26     .684     .856     1.058     1.315     1.706     2.056     2.162     2.479     2.779     3.067     3.435     3.707       27     .684     .855     1.057     1.314     1.703     2.052     2.158     2.473     2.771     3.057     3.421     3.690       28     .683     .855     1.056     1.313     1.701     2.048     2.154     2.467     2.763     3.047     3.408     3.674       29     .683     .854     1.055     1.310     1.697     2.042	21												
24   .685   .857   1.059   1.318   1.711   2.064   2.172   2.492   2.797   3.091   3.467   3.745     25   .684   .856   1.058   1.316   1.708   2.060   2.167   2.485   2.787   3.078   3.450   3.725     26   .684   .856   1.058   1.315   1.706   2.056   2.162   2.479   2.779   3.067   3.435   3.707     27   .684   .855   1.057   1.314   1.703   2.052   2.158   2.473   2.771   3.057   3.421   3.690     28   .683   .855   1.056   1.313   1.701   2.048   2.154   2.467   2.763   3.047   3.408   3.674     29   .683   .854   1.055   1.311   1.699   2.045   2.150   2.462   2.756   3.038   3.396   3.659     30   .683   .854   1.055   1.310   1.697   2.042   2.147   2.457   2.750   3.030   3.385   3.646     40 <td></td>													
25     .684     .856     1.058     1.316     1.708     2.060     2.167     2.485     2.787     3.078     3.450     3.725       26     .684     .856     1.058     1.315     1.706     2.056     2.162     2.479     2.779     3.067     3.435     3.707       27     .684     .855     1.057     1.314     1.703     2.052     2.158     2.473     2.771     3.057     3.421     3.690       28     .683     .855     1.056     1.313     1.701     2.048     2.154     2.467     2.763     3.047     3.408     3.674       29     .683     .854     1.055     1.311     1.699     2.045     2.150     2.462     2.756     3.038     3.396     3.659       30     .683     .854     1.055     1.310     1.697     2.042     2.147     2.457     2.750     3.030     3.385     3.646       40     .681     .851     1.050     1.303     1.684     2.021	23							2.177					
26     .684     .856     1.058     1.315     1.706     2.056     2.162     2.479     2.779     3.067     3.435     3.707       27     .684     .855     1.057     1.314     1.703     2.052     2.158     2.473     2.771     3.057     3.421     3.690       28     .683     .855     1.056     1.313     1.701     2.048     2.154     2.467     2.763     3.047     3.408     3.674       29     .683     .854     1.055     1.311     1.699     2.045     2.150     2.462     2.756     3.038     3.396     3.659       30     .683     .854     1.055     1.310     1.697     2.042     2.147     2.457     2.750     3.030     3.385     3.646       40     .681     .851     1.050     1.303     1.684     2.021     2.123     2.423     2.704     2.971     3.307     3.551       50     .679     .849     1.047     1.299     1.676     2.009	24				1.318	1.711		2.172	2.492	2.797	3.091		
27 .684 .855 1.057 1.314 1.703 2.052 2.158 2.473 2.771 3.057 3.421 3.690   28 .683 .855 1.056 1.313 1.701 2.048 2.154 2.467 2.763 3.047 3.408 3.674   29 .683 .854 1.055 1.311 1.699 2.045 2.150 2.462 2.756 3.038 3.396 3.659   30 .683 .854 1.055 1.310 1.697 2.042 2.147 2.457 2.750 3.030 3.385 3.646   40 .681 .851 1.050 1.303 1.684 2.021 2.123 2.423 2.704 2.971 3.307 3.551   50 .679 .849 1.047 1.299 1.676 2.009 2.109 2.403 2.678 2.937 3.261 3.496   60 .679 .848 1.045 1.296 1.671 2.000 2.099 2.390 2.660 2.915 3.232 3.460	25							2.167	2.485				
28 .683 .855 1.056 1.313 1.701 2.048 2.154 2.467 2.763 3.047 3.408 3.674   29 .683 .854 1.055 1.311 1.699 2.045 2.150 2.462 2.756 3.038 3.396 3.659   30 .683 .854 1.055 1.310 1.697 2.042 2.147 2.457 2.750 3.030 3.385 3.646   40 .681 .851 1.050 1.303 1.684 2.021 2.123 2.423 2.704 2.971 3.307 3.551   50 .679 .849 1.047 1.299 1.676 2.009 2.109 2.403 2.678 2.937 3.261 3.496   60 .679 .848 1.045 1.296 1.671 2.000 2.099 2.390 2.660 2.915 3.232 3.460	26			1.058	1.315			2.162	2.479	2.779	3.067		
29 .683 .854 1.055 1.311 1.699 2.045 2.150 2.462 2.756 3.038 3.396 3.659   30 .683 .854 1.055 1.310 1.697 2.042 2.147 2.457 2.750 3.030 3.385 3.646   40 .681 .851 1.050 1.303 1.684 2.021 2.123 2.423 2.704 2.971 3.307 3.551   50 .679 .849 1.047 1.299 1.676 2.009 2.109 2.403 2.678 2.937 3.261 3.496   60 .679 .848 1.045 1.296 1.671 2.000 2.099 2.390 2.660 2.915 3.232 3.460	27				1.314			2.158	2.473	2.771			
30 .683 .854 1.055 1.310 1.697 2.042 2.147 2.457 2.750 3.030 3.385 3.646   40 .681 .851 1.050 1.303 1.684 2.021 2.123 2.423 2.704 2.971 3.307 3.551   50 .679 .849 1.047 1.299 1.676 2.009 2.109 2.403 2.678 2.937 3.261 3.496   60 .679 .848 1.045 1.296 1.671 2.000 2.099 2.390 2.660 2.915 3.232 3.460	28							2.154	2.467				
40 .681 .851 1.050 1.303 1.684 2.021 2.123 2.423 2.704 2.971 3.307 3.551   50 .679 .849 1.047 1.299 1.676 2.009 2.109 2.403 2.678 2.937 3.261 3.496   60 .679 .848 1.045 1.296 1.671 2.000 2.099 2.390 2.660 2.915 3.232 3.460					1.311			2.150	2.462	2.756		3.396	
50     .679     .849     1.047     1.299     1.676     2.009     2.109     2.403     2.678     2.937     3.261     3.496       60     .679     .848     1.045     1.296     1.671     2.000     2.099     2.390     2.660     2.915     3.232     3.460								2.147	2.457			3.385	
60   .679								2.123					
					1.299				2.403				
80 L 678 846 1.043 1.292 1.664 1.990 2.088 2.374 2.639 2.887 3.195 3.416		.679	.848						2.390		2.915		
	80	678	846	1 043	1 202	1 664	1 990	2.088	2.374	2.639	2.887	3 195	3 416

### t分布图如下:



由于 t 统计量 6.53 远查出 t 临界值,所以可以拒绝零假设(说出正确墨色名称的时间 与 颜色词是否匹配上对应的油墨颜色 无关),说明显著水平为 0.05 时,存在显著差异。

### 置信区间:

以上采用95%置信水平对应的置信空间为:

$$CI = \overline{X}_D \pm t_{critical} \cdot SE = (2.52, 10.41)$$

6. 可选: 你觉得导致所观察到的效应的原因是什么? 你是否能想到会取得类似效应的 替代或类似任务? 进行一些调查研究将有助于你思考这两个问题!

以上可推论出油墨颜色与颜色词会导致人的误解,颜色与字体所代表的都是颜色, 混淆测试者的判断,会导致说出正确墨色的时间变长。 优达学城 2016年9月