

P1NDDA-Test a perceptual phenomenon - Conclusions

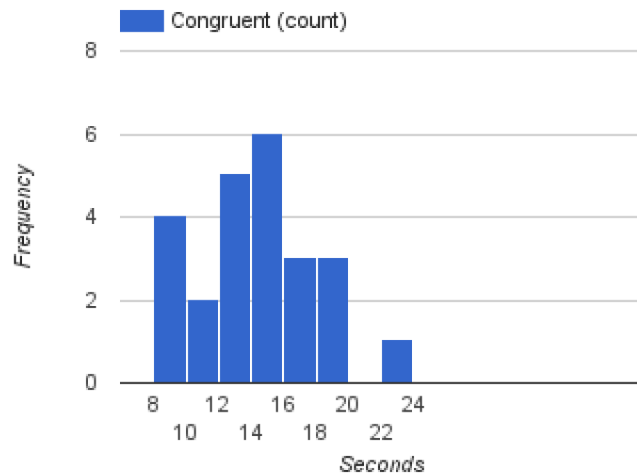
Independent Variable	Dependent Variable	mean of congruent samples	Hypothesis and Definitions
Ink Color of Text	time in seconds	$X_c = 14.05$	MU_c : Mean of the samples of Congruent results
		Mean of Incongruent Samples	MU_i : Mean of the samples of Incongruent results
Number of participants = 24		$X_i = 22.016$	H₀ : Null hypothesis
			H_a : Alternative hypothesis
Mean difference (rounded)	-7.965		
Standard Deviation (rounded)	4.865		Hypothesis:
cohen's d (rounded)	-1.64		H₀: MU_c=MU_i
This tells us that incongruents results are, on average, 1.64 deviations from the sample standard deviations of congruent results			Null hypothesis: I expect the difference between the sample means of the sample sets Congruent and Incongruent to = approximately 0, or at least statistically close to 0
r² = 0.728			
72.8% of the difference in means can be explained by the ink color/text incongruency			
			H_a: MU_c != MU_i
Out of curiosity I decided to measure at all three alpha levels to see how they might differ in resulting confidence levels			Alternative hypothesis: I expect the difference between the sample means of the sample sets Congruent and Incongruent to be statistically significantly different from 0
The results show that even at lower alpha levels the confidence levels are fairly consistent			
@level 0.05	@level 0.01	@.001	
T CRITICAL	T CRITICAL	T CRITICAL	
2.069 +/-	2.807 +/-	3.768 +/-	I used t-test, as it best allowed me to analyze the data provided as the sample sets fits into the "within-subject" repeated tests measures design, and both sample sets are samples of populations of an undetermined size, rather than whole populations
Confidence intervals	Confidence intervals	Confidence intervals	
-10.10 to -5.85	-10.84 to -5.19	-11.82 to -4.23	
point estimate: - 7.96479167			
pe rounded	-7.965		
sample standard deviation of differences			I chose a non directional alternative hypothesis (2 tailed test) as I did not wish to draw conclusions before the analysis was completed regarding the direction of differences in populations
4.86482691	rounded = 4.865		
t statistic	-8.0211		
Result: reject null at all confidence levels			That said, given the large body of research available on

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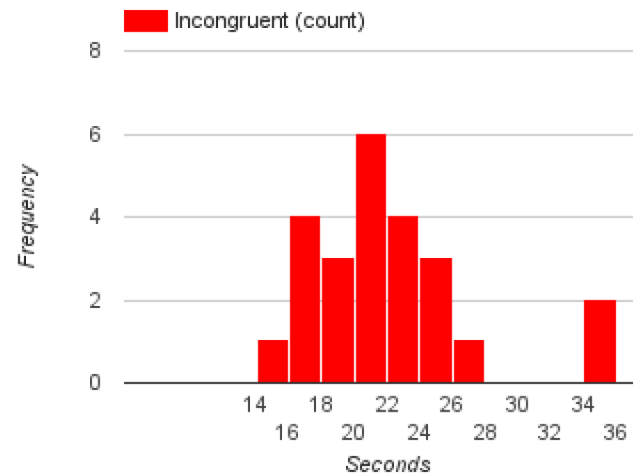
				the topic I could have just as easily used a directional
Conclusions				(one tailed test) with $H_a: \mu_{Uc} < \mu_{Ui}$ (the mean of the
Participants took significantly longer to identify the colors when the ink color was incongruent with the color name.				samples of the Incongruent samples would be
The ink color has a causal effect on participants speed identifying colors when the ink color was incongruent with the color name.				statistically significantly larger than the mean of the
				samples of the Congruent samples) as an alternative
				hypothesis
My expectation based on the research materials provided and my own experience taking the Stroop test was that there would be a significant difference with incongruent text/color pairings taking longer (in seconds) to identify. The results at all 3 alpha levels matched my expectation.				
The most common theory for the Stroop effect is Automacity. Namely that recognizing colors is not an automatic process while reading words is. Having no experience in neuroscience myself I am not qualified to reject/accept this hypothesis.				
That said, the section on Neuroanatomy in the Wikipedia page (listed in the resources section of this document), would seem to indicate that in part the participants self assessed anticipated response probability of error causes an increase in evaluation times.				
This anticipated increase in probability error could be a lurking variable. It would be interesting to see a Stroop test done in a fashion where the participants are unaware there could be a probability error.				

P1NDDA-Test a perceptual phenomenon - Charts and graphs

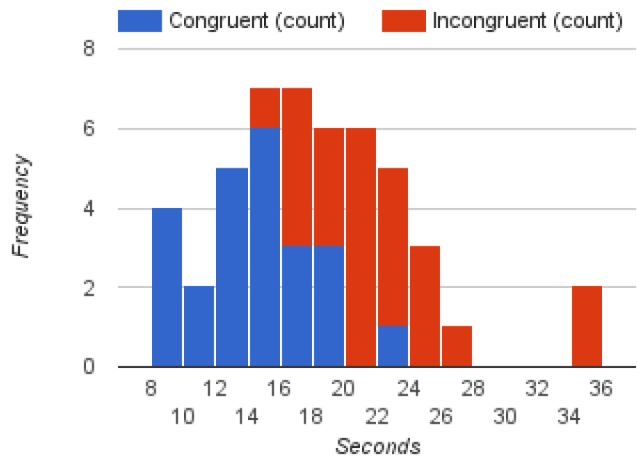
Histogram of Congruent



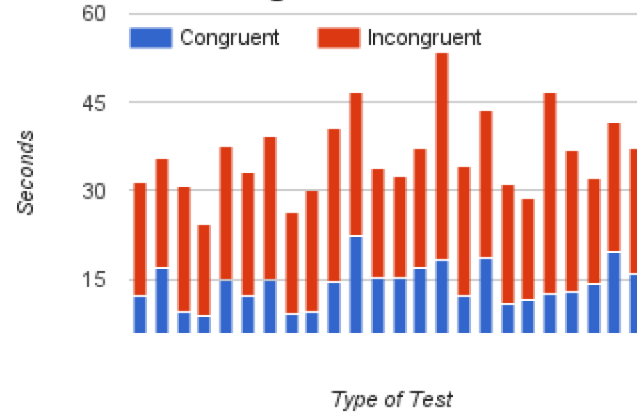
Histogram of Incongruent



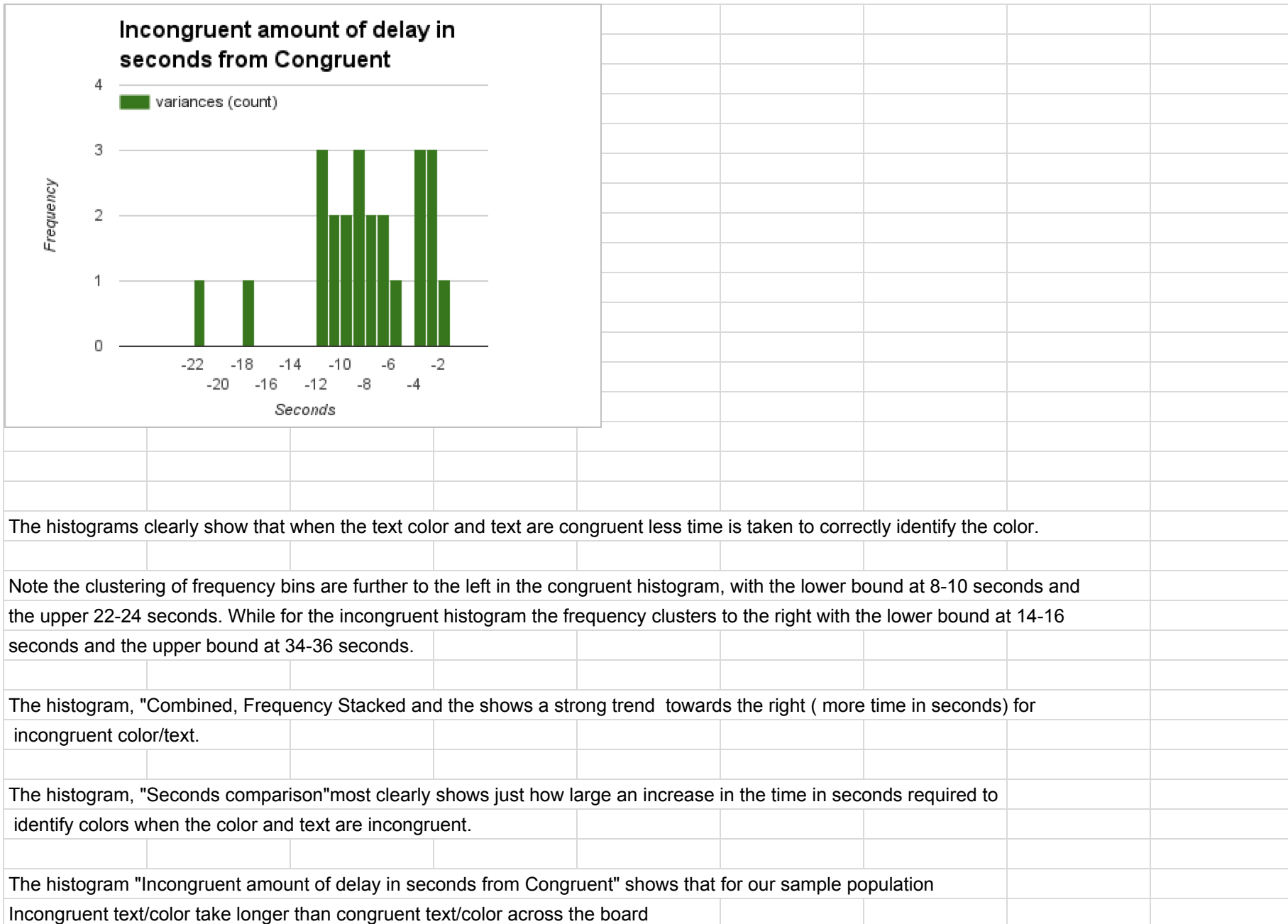
Combined, Frequency Stacked



Seconds Comparison, Congruent vs. Incongruent



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P1NDDA-Test a perceptual phenomenon - stroop data and calculations

Congruent	Incongruent	variances	ave variance	variance sq	sum sq var
12.079	19.278	-7.199	-7.964791667	0.5864368772	23.66654087
16.791	18.741	-1.95		36.1777188	
9.564	21.214	-11.65		13.58076046	
8.63	15.687	-7.057		0.8240857107	sample standard
14.669	22.803	-8.134		0.02863145996	deviation of differences
12.238	20.878	-8.64		0.455906293	4.86482691
14.692	24.572	-9.88		3.668022959	
8.987	17.394	-8.407		0.1955482098	
9.401	20.762	-11.361		11.53423104	
14.48	26.282	-11.802		14.72416779	
22.328	24.524	-2.196		33.2789573	
15.298	18.644	-3.346		21.33323646	
15.073	17.51	-2.437		30.55648071	
16.929	20.33	-3.401		20.82819438	
18.2	35.255	-17.055		82.63188754	
12.13	22.158	-10.028		4.256828625	
18.495	25.139	-6.644		1.744490628	
10.639	20.429	-9.79		3.331385459	
11.344	17.425	-6.081		3.548671045	
12.369	34.288	-21.919		194.7199302	
12.944	23.894	-10.95		8.911468791	
14.233	17.96	-3.727		17.95887821	
19.71	22.058	-2.348		31.54834863	
16.004	21.157	-5.153		7.906172379	
Sum Congruent	Sum Incongruent				
337.227	528.382				
Average of sums		Xc = 14.05	Xi = 22.016		
14.051125	22.01591667	point estimate: - 7.96479167			
Rounded Averages					
14.05	22.016				

P1NDDA-Test a perceptual phenomenon - Resources

Resources
https://en.wikipedia.org/wiki/Stroop_effect
https://faculty.washington.edu/chudler/java/ready.html
https://docs.google.com/document/d/1-OkpZLjG_kX9J6LIQ5lItsgMzVWjh36QpnP2RYpVdPU/pub?embedded=True