Results Summary

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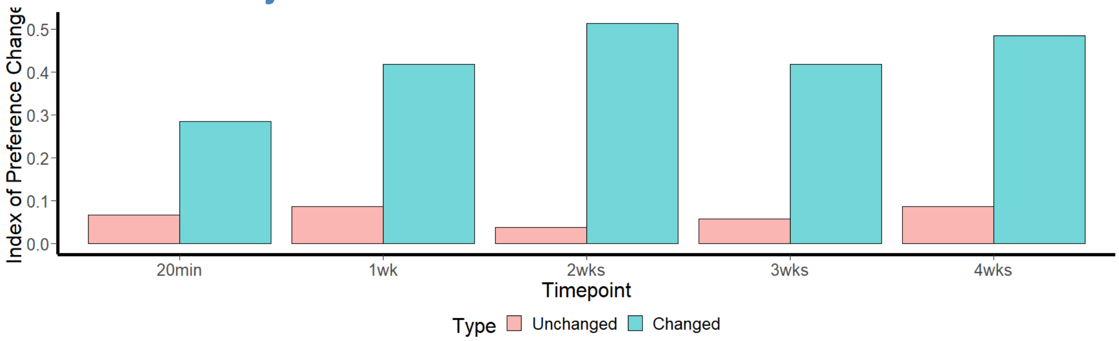
5/24/2021

Illustrative Subjects



An illustration of the differences in aesthetic-preference instability across subjects. Index of Preference Change Relative to Session 1A for the two illustrative subjects. The horizontal axis represents time elapsed, corresponding with the radar plots above and the asterisks indicate that the change in preference is statistically significant.

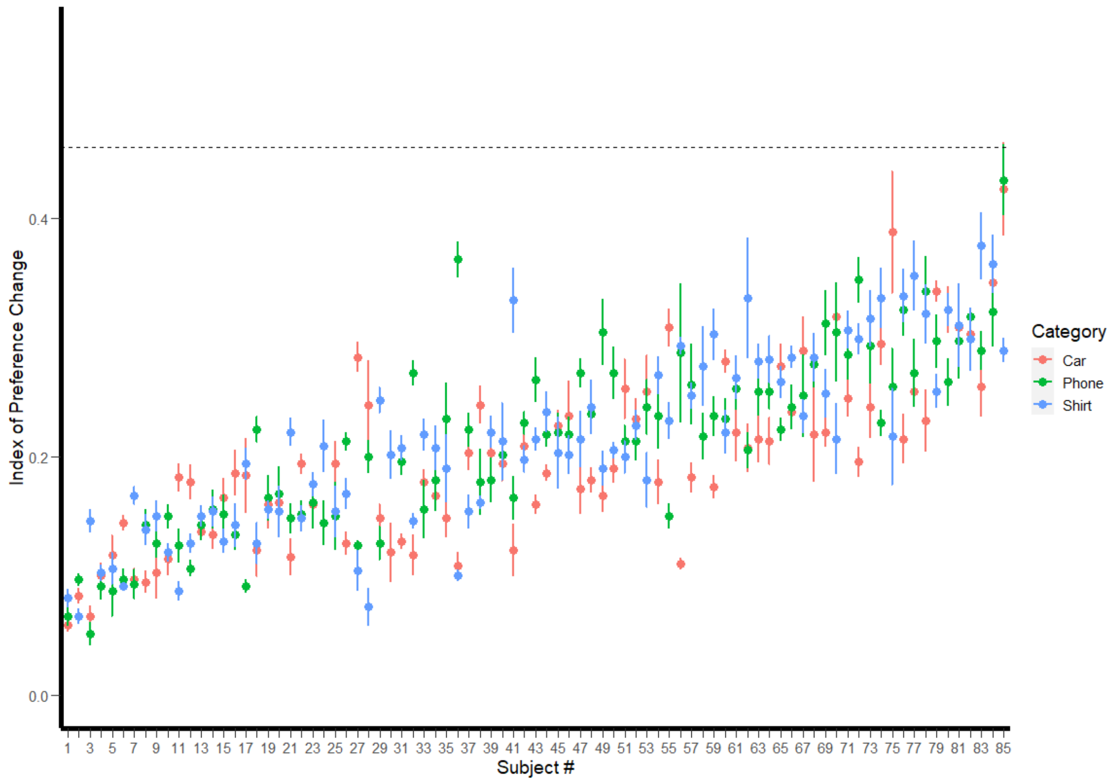
Individual Differences in Preference Instability

ANOVA table

	SS	df	F	p	partial η^2
Subname	5.094	84	18.077	0	0.561
Residuals	3.992	1190			

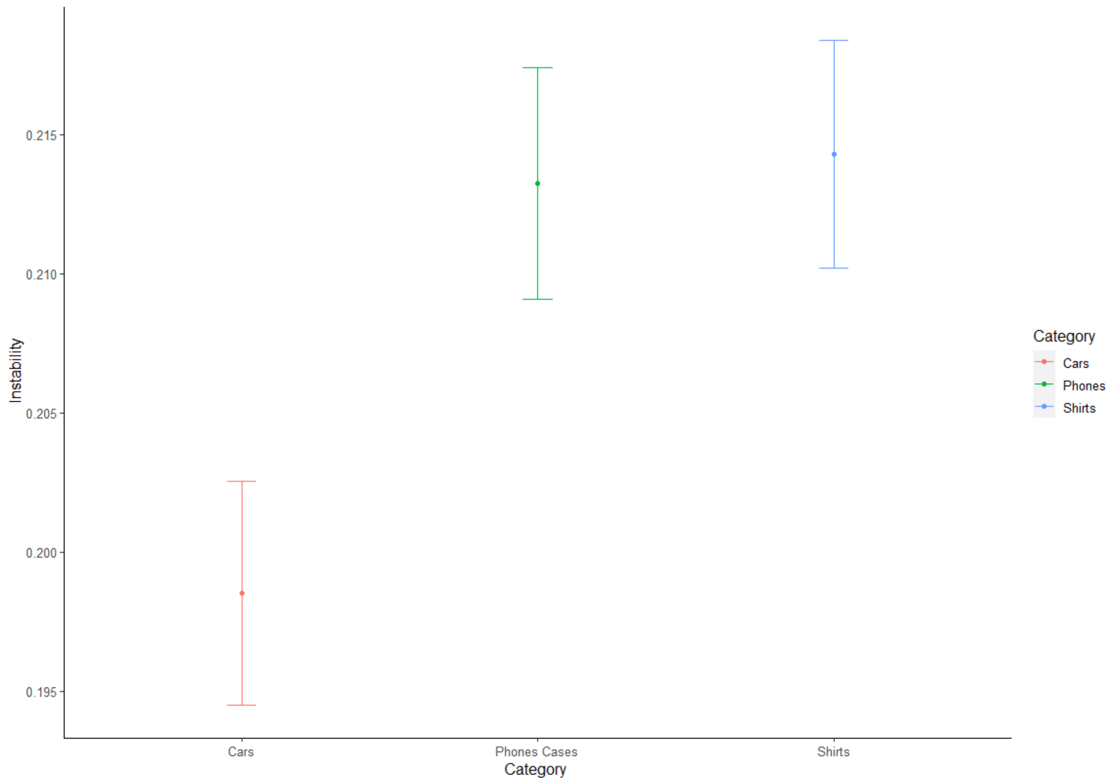
R^2=0.56, $F(84,1190) = 18.08, p =< .001$.

All Subjects x Categories



Mean Index of Preference Change relative to Session 1A, colored by object category. Subjects are numbered in order of increasing mean index, with the error bars indicating standard errors (all error bars in this article are standard errors). The dotted line represents the index of a subject choosing at random. Thus, almost all participants are significantly more stable than chance. We can also see that instability is highly individual, that is, the difference of instability between the most and least stable subjects is significant. The statistical analysis in the text reveals that phones and shirts are overall more unstable than cars. However, the graph shows that, for some individuals, cars are the most unstable. Not only that, all six possible orders of rankings of categories can be observed across the subjects.

Categories Only



Category wise comparison in regards to mean instability. The graph shows that Cars were the most stable, while phones and shirts were equal

ANOVA

ANOVA table

	SS	df	F	p	partial η^2
Category	0.066	2	4.662	0.01	0.007
Residuals	9.020	1272			

R^2=0.01, $F(84{,}1272) = 4.66, p = 0.01.$

Post Hoc Tukey

```
##   Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = Instability ~ Category, data = allPairsDistance_AF)
##
## $Category
##                     diff          lwr        upr     p adj
## phone-car   0.014722689  0.001167810 0.02827757 0.0294098
```

```
## shirt-car   0.015775910  0.002221031 0.02933079 0.0175867
## shirt-phone 0.001053221 -0.012501658 0.01460810 0.9818418
```

Is there a Category and Subject interaction?

ANOVA table

	SS	df	F	p	partial η^2
Category	0.001	2	0.356	0.701	0.001
subSortAF	2.267	84	14.173	0.000	0.539
Category:subSortAF	1.984	168	6.201	0.000	0.505
Residuals	1.942	1020			

R^2=0.79, $F(84,1020) = 14.77, p =< .001$.

There appears to be an intreaction.However, not a clear one.

Instability Relative To The First Session

ANOVA table

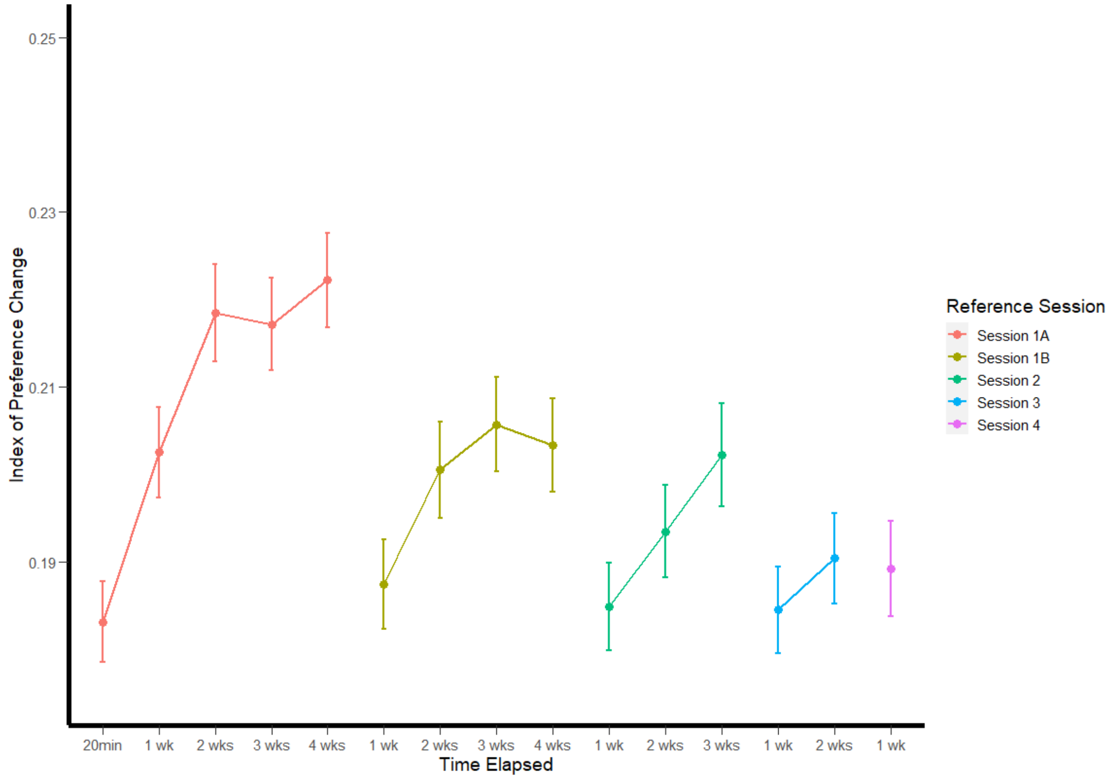
	SS	df	F	p	partial η^2
Timepoint	0.596	14	5.97	0	0.021
Residuals	27.148	3810			

R^2=0.02, $F(84,3810) = 5.97, p =< .001$.

Tukey HSD

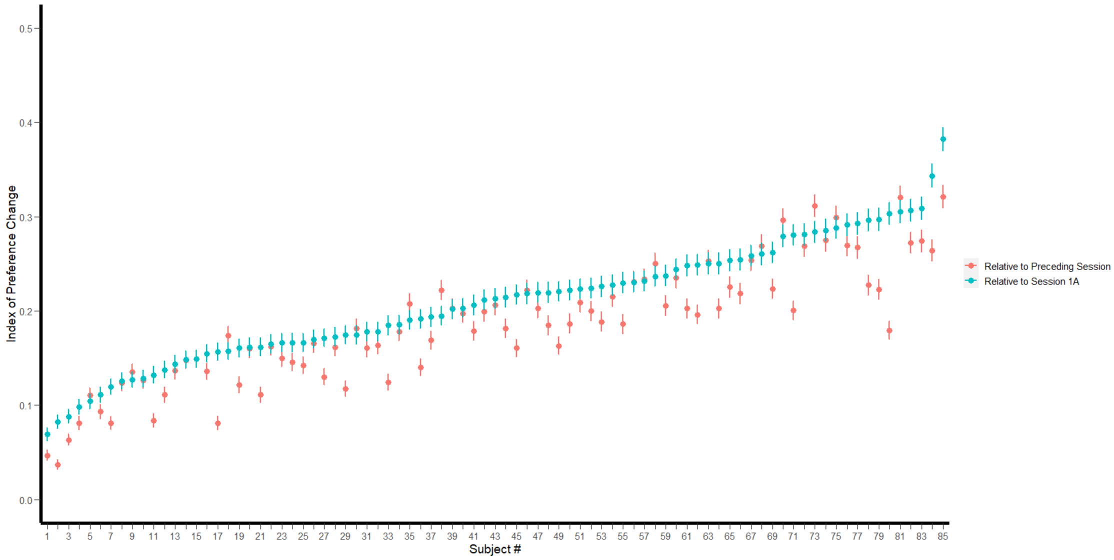
```
##   Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = Instability ~ Timepoint, data = allPairsDistance_AF)
##
## $Timepoint
##              diff           lwr        upr     p adj
## AC-AB  0.019383754 -0.0007778015 0.03954531 0.0662544
## AD-AB  0.035331466  0.0151699109 0.05549302 0.0000187
## AE-AB  0.034024276  0.0138627214 0.05418583 0.0000435
## AF-AB  0.039103641  0.0189420864 0.05926520 0.0000014
## AD-AC  0.015947712 -0.0042138426 0.03610927 0.1954452
## AE-AC  0.014640523 -0.0055210321 0.03480208 0.2745288
## AF-AC  0.019719888 -0.0004416671 0.03988144 0.0587607
## AE-AD -0.001307190 -0.0214687446 0.01885437 0.9997800
## AF-AD  0.003772176 -0.0163893795 0.02393373 0.9862823
## AF-AE  0.005079365 -0.0150821899 0.02524092 0.9590602
```

Instability Relative To All Sessions



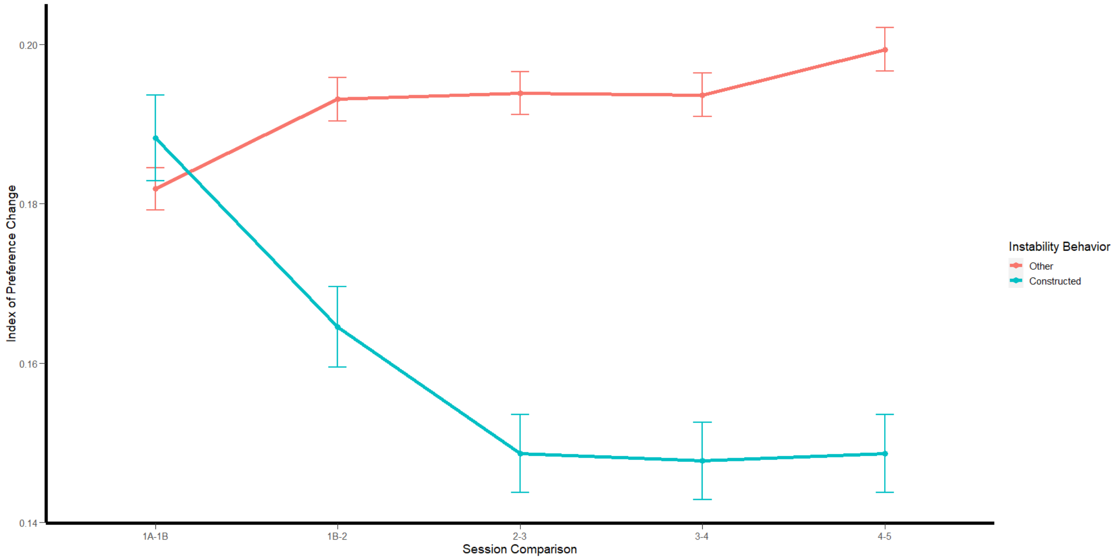
Subject Index of Preference Change Relative to a Fixed Earlier Session. The vertical axis represents mean overall index across subjects. The five different curves represent different reference sessions, colored as shown in the legend. The horizontal axis represents time elapsed relative to the starting point of each session. In general, the index of preference change increases as a function of time after the reference session, plateauing after long delays. Furthermore, this index decreases as the reference session increases and subjects complete more sessions, suggesting a stabilizing effect of making a choice.

Comparing Instability Relative To First Session vs Consecutive Sessions



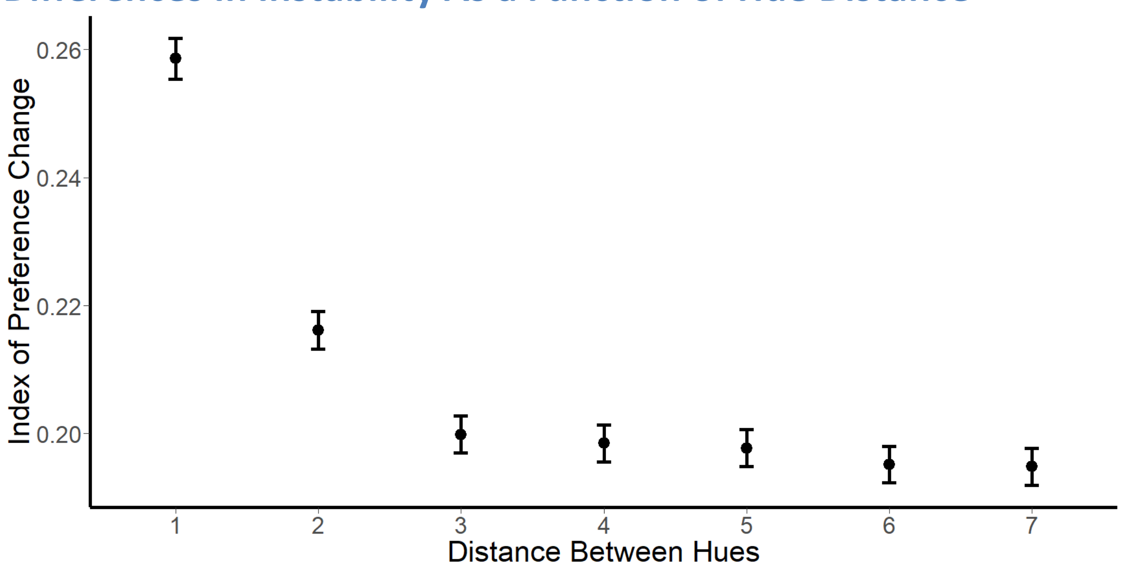
Evidence that choice stabilizes aesthetic preference. (A) Index of Preference Change for each subject as a measured relative to Session 1A (blue) or relative to the preceding session (red). Lower indices in the latter suggest that the subject was updating preferences concordantly after each session. Asterisks represent a statistically significant difference between the mean indices at preceding sessions compared to Session 1A, as measured by a proportion z test. A total of 17 subjects passed this test. We refer to these subjects as "Constructed" because their later choices are constructed upon the earlier ones (a term borrowed from the economics literature).

Comparing Subjects Who ‘constructed’ Their Preferences To Those Who Did Not



(B) Subject Index of Preference Change relative to the preceding session, separating Constructed (blue) and Other (red) subjects in two groups. The horizontal axis represents consecutive sessions being compared. While the blue line falls, the red line does not. The diverging lines indicate that Constructed subjects, but not the others, tend to update their preferences from one session to the next one.

Differences In Instability As a Function of Hue Distance



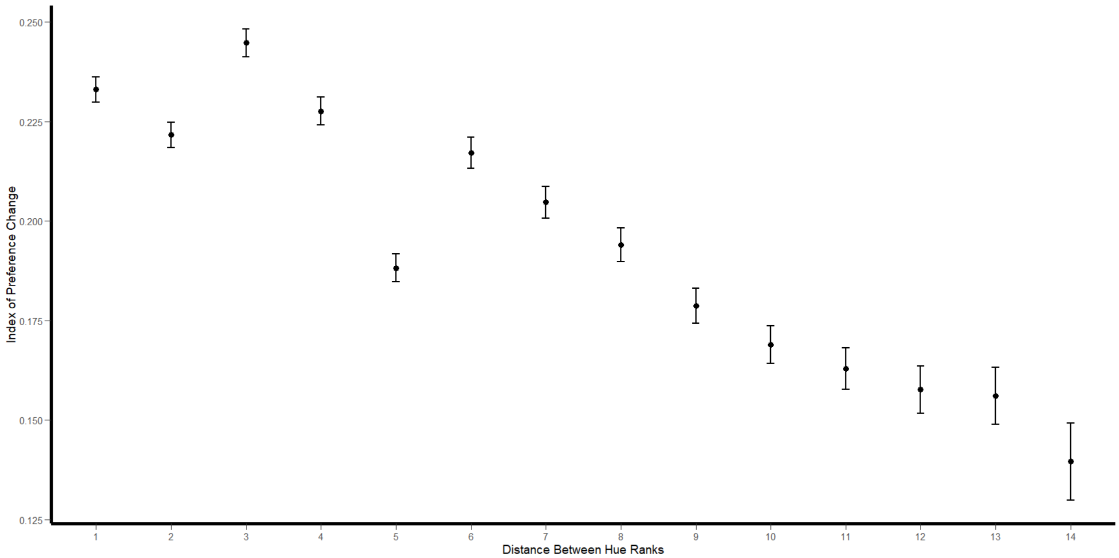
Instability as a function of object hue difference. The x-axis represent the difference (distance) in hues on a given trial.

ANOVA table

	SS	df	F	p	partial η^2
diff	61.575	6	62.316	0	0.003
Residuals	22046.122	133868			

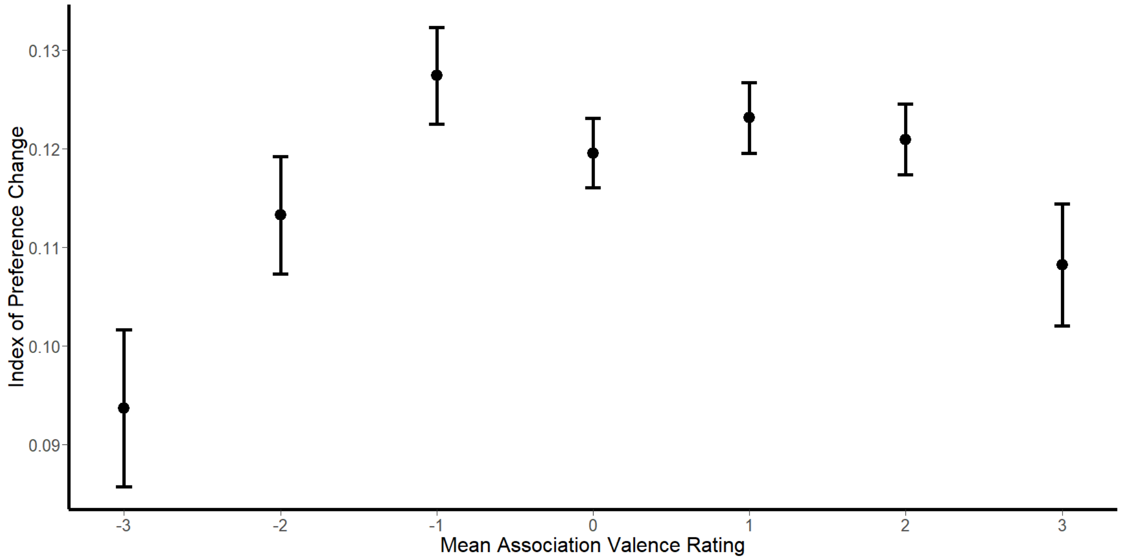
R^2=0, $F(84, 1.33868 \times 10^5) = 62.32, p =< .001$.

Instability As a Function of Hue Rank



) Index of Preference Change as a function of the difference between the preference ranks between two hues. This is generally a declining function regardless of the hues. This decline again indicates that hues that have similar preferences and are thus harder to compare, yield more instability, regardless if they are neighbors in chromatic space.

Relationship Between Valence and Instability



The relationship between associaion valence and instability. Here, instability is defined as the mean change in the number of times a stimuli was picked, while the mean association valence is the average of the association valences a stimuli. The data is limited to cars and shirts only.

ANOVA

ANOVA table

	SS	df	F	p	partial η^2
meanValence	0.012	1	1.676	0.196	0.001
meanValenceSqrd	0.076	1	10.411	0.001	0.004
Residuals	18.191	2487			

R^2=0, $F(84{,}2487) = 5.23, p = 0.005$.

Tukey

```
##   Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = fixed_diff ~ as.factor(meanValence), data = allCountsSu
mmary)
##
## $`as.factor(meanValence)`
##                 diff           lwr         upr     p adj
## -2--3  0.019584374 -0.0161997494 0.055368498 0.6726989
## -1--3  0.033712160  0.0001247164 0.067299603 0.0484480
## 0--3   0.025863399 -0.0067467856 0.058473584 0.2252193
## 1--3   0.029435353 -0.0029380908 0.061808797 0.1029555
## 2--3   0.027256446 -0.0049853110 0.059498202 0.1615824
```

```
## 3--3   0.014531619 -0.0205361835 0.049599422 0.8854902
## -1--2  0.014127785 -0.0090227380 0.037278309 0.5476521
## 0--2   0.006279025 -0.0154293731 0.027987423 0.9790834
## 1--2   0.009850979 -0.0115001397 0.031202097 0.8222795
## 2--2   0.007672071 -0.0134788450 0.028822987 0.9367530
## 3--2  -0.005052755 -0.0303031249 0.020197615 0.9970968
## 0--1  -0.007848760 -0.0257056182 0.010008098 0.8535694
## 1--1  -0.004276806 -0.0216975724 0.013143959 0.9911325
## 2--1  -0.006455714 -0.0236305235 0.010719095 0.9255140
## 3--1  -0.019180540 -0.0412076601 0.002846579 0.1358644
## 1-0    0.003571954 -0.0118809069 0.019024815 0.9935883
## 2-0    0.001393046 -0.0137819958 0.016568088 0.9999678
## 3-0   -0.011331780 -0.0318379211 0.009174361 0.6624259
## 2-1   -0.002178908 -0.0168382941 0.012480479 0.9994617
## 3-1   -0.014903734 -0.0350312656 0.005223798 0.3039948
## 3-2   -0.012724826 -0.0326398591 0.007190206 0.4902268
```

Compare Models

```
## $Models
##   Formula
## 1 "fixed_diff ~ meanValence"
## 2 "fixed_diff ~ meanValence + meanValenceSqrd"
##
## $Fit.criteria
##   Rank Df.res   AIC  AICc   BIC R.squared   Adj.R.sq  p.value Shapiro.W
## 1    2   2488 -5166 -5166 -5148 1.609e-05 -0.0003858 0.841400    0.8714
## 2    3   2487 -5174 -5174 -5151 4.185e-03  0.0033840 0.005435    0.8721
##   Shapiro.p
## 1 3.014e-41
## 2 3.646e-41

## Analysis of Variance Table
##
## Model 1: fixed_diff ~ meanValence
## Model 2: fixed_diff ~ meanValence + meanValenceSqrd
##   Res.Df    RSS Df Sum of Sq      F   Pr(>F)
## 1   2488 18.267
## 2   2487 18.191  1  0.076151 10.411 0.001269 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

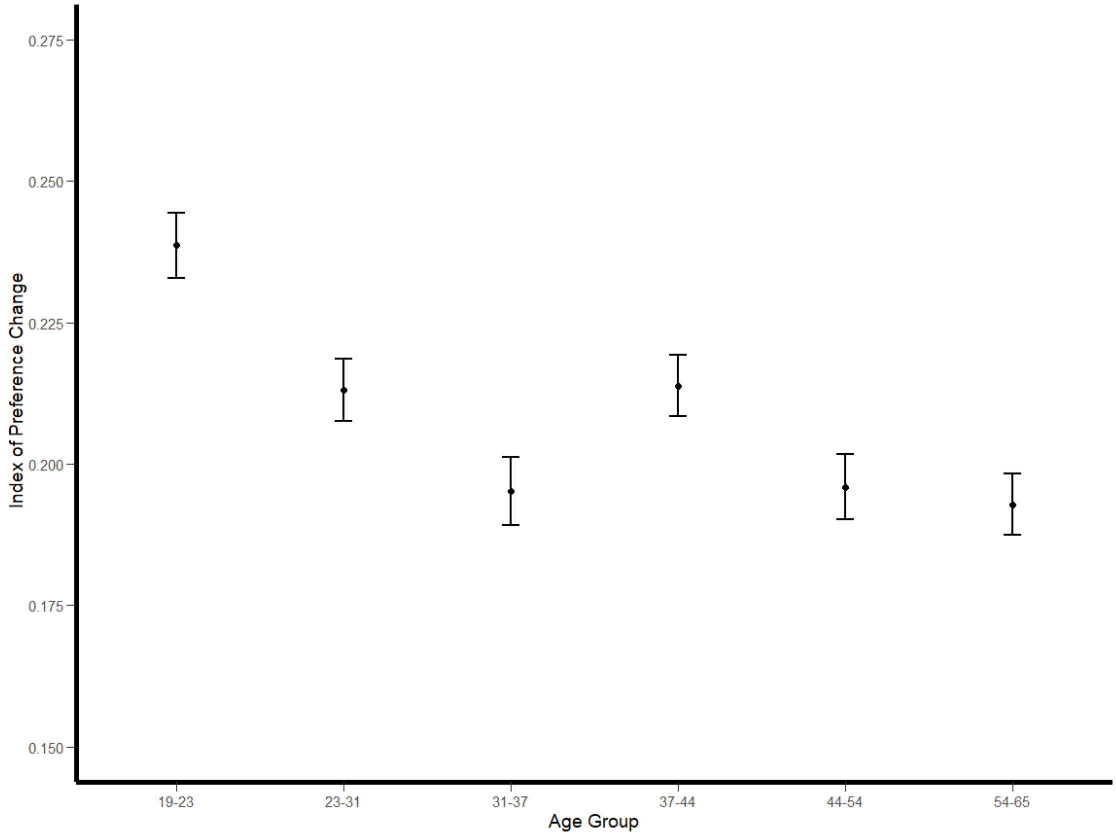
Gender Differences

Men are more unstable than women in their aesthetic preferences.

T test For Gender Differences

```
##
##  Welch Two Sample t-test
##
## data:  Instability by Gender
## t = -2.5555, df = 1141.3, p-value = 0.01073
## alternative hypothesis: true difference in means between group Female and
group Male is not equal to 0
## 95 percent confidence interval:
##  -0.021737036 -0.002855651
## sample estimates:
## mean in group Female   mean in group Male
##            0.2018881            0.2141844
```

Age Differences



Age groups between 19-29 are more unstable than the older age groups from 29-65.

ANOVA

ANOVA table

	SS	df	*F*	*p*	partial η^2
adaptiveCut	0.352	5	10.221	0	0.039
Residuals	8.735	1269			
R^2=0.04, \$F	(84, 126	9)=10.2	2\$, \$p=<.	001\$	

Age and gender interaction

ANOVA table

	SS	df	*F*	*p*	partial η^2
adaptiveCut	0.589	5	17.990	0.000	0.066
Gender	0.066	1	10.118	0.002	0.008
adaptiveCut:Gender	0.425	5	12.965	0.000	0.049

Residuals	8.274	1263

R^2=0.09, \$F(84, 12 63)=11.2 7\$, \$p= <.001\$

Tukey Post Hoc

```
##   Tukey multiple comparisons of means
##     95% family-wise confidence level
##
## Fit: aov(formula = Instability ~ adaptiveCut, data = allPairsDistance_AF)
##
## $adaptiveCut
##                           diff         lwr           upr     p adj
## (23,31]-(19,23] -0.0255714286 -0.04754410 -0.0035987525 0.0118344
## (31,37]-(19,23] -0.0434761905 -0.06544887 -0.0215035144 0.0000003
## (37,44]-(19,23] -0.0247979798 -0.04874400 -0.0008519634 0.0373746
## (44,54]-(19,23] -0.0426870748 -0.06506111 -0.0203130381 0.0000009
## (54,65]-(19,23] -0.0457709751 -0.06814501 -0.0233969383 0.0000001
## (31,37]-(23,31] -0.0179047619 -0.04022902  0.0044194994 0.1991892
## (37,44]-(23,31]  0.0007734488 -0.02349558  0.0250424794 0.9999991
## (44,54]-(23,31] -0.0171156463 -0.03983506  0.0056037653 0.2623272
## (54,65]-(23,31] -0.0201995465 -0.04291896  0.0025198651 0.1141139
## (37,44]-(31,37]  0.0186782107 -0.00559082  0.0429472413 0.2399529
## (44,54]-(31,37]  0.0007891156 -0.02193030  0.0235085273 0.9999987
## (54,65]-(31,37] -0.0022947846 -0.02501420  0.0204246270 0.9997330
## (44,54]-(37,44] -0.0178890950 -0.04252210  0.0067439087 0.3023169
## (54,65]-(37,44] -0.0209729953 -0.04560600  0.0036600084 0.1466816
## (54,65]-(44,54] -0.0030839002 -0.02619171  0.0200239055 0.9989611
```

Pearson correlation vs Kendall correlation

```
##
##  Pearson's product-moment correlation
##
## data:  allPairsDistance_AF$Age and allPairsDistance_AF$Instability
## t = -6.4483, df = 1273, p-value = 1.602e-10
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  -0.2304981 -0.1241621
## sample estimates:
##        cor
## -0.1778492
```

```
##
##  Kendall's rank correlation tau
##
## data:  allPairsDistance_AF$Age and allPairsDistance_AF$Instability
## z = -6.504, p-value = 7.821e-11
## alternative hypothesis: true tau is not equal to 0
## sample estimates:
```

```
##         tau
## -0.1254657
```