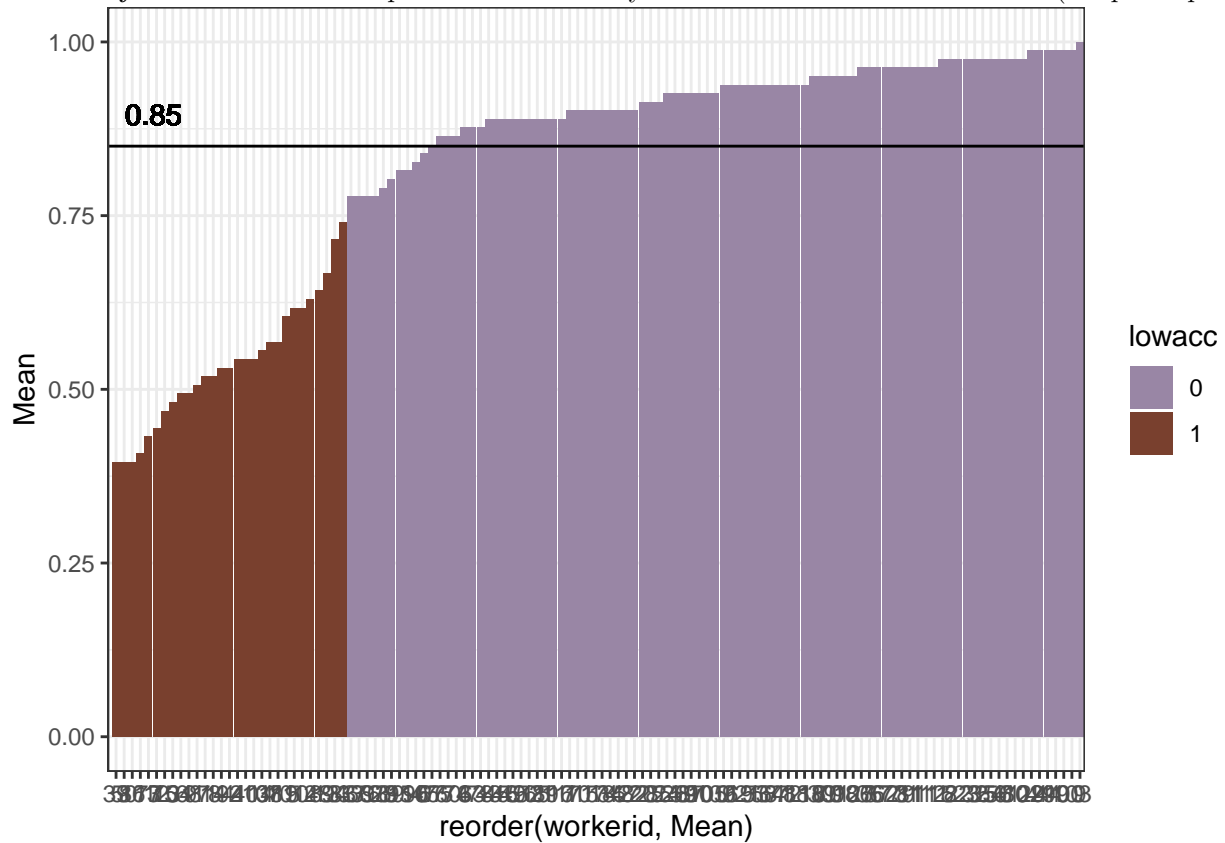


# Perceptual Difficulty - Timed Perceptibility2 (difficulty analysis)

## Stimuli check

```
##
##          color material
## 'no'    0      81      81
## 'yes'   0      81      81
```

**Accuracy exclusions** Participants with accuracy lower than 75% are excluded (29 participants)



```
## # A tibble: 29 x 7
##   workerid Mean  CILow CIHigh YMin  YMax lowacc
##   <int> <dbl> <dbl> <dbl> <dbl> <dbl> <chr>
## 1      2 0.630 0.111 0.0991 0.519 0.729 1
## 2      4 0.543 0.0988 0.111 0.444 0.654 1
## 3      5 0.617 0.111 0.111 0.506 0.728 1
## 4     11 0.519 0.111 0.0988 0.407 0.617 1
## 5     12 0.444 0.111 0.111 0.333 0.556 1
## 6     13 0.667 0.0988 0.0988 0.568 0.765 1
## 7     14 0.519 0.111 0.111 0.407 0.630 1
## 8     31 0.494 0.111 0.0991 0.383 0.593 1
## 9     38 0.568 0.0988 0.111 0.469 0.679 1
```

```
## 10      39 0.395 0.111  0.111  0.284 0.506 1
## # ... with 19 more rows
```

## By response times

Regardless of response correctness and feature matching

```
## # A tibble: 15 x 7
##   label          feature    Mean CILow CIHigh count group
##   <fct>         <fct>      <dbl> <dbl>  <dbl> <int> <chr>
## 1 bowl_metal_green  ['silver'] 1239. 158.   142.    22 rt
## 2 chair_metal_purple ['metal'] 1222. 129.   142.    24 rt
## 3 pitcher_glass_blue ['plastic'] 1190. 135.   147.    23 rt
## 4 jacket_leather_green ['denim'] 1184.  98.9  108.    23 rt
## 5 chair_metal_purple ['silver'] 1183. 160.   165.    22 rt
## 6 jacket_leather_original ['rubber'] 1160. 112.   113.    24 rt
## 7 pitcher_plastic_blue ['rubber'] 1158. 132.   141.    23 rt
## 8 jacket_denim_purple ['denim'] 1157. 135.   162.    23 rt
## 9 chair_metal_purple ['plastic'] 1149. 112.   120.    24 rt
## 10 boot_leather_brown ['rubber'] 1149. 101.    93.7    23 rt
## 11 jacket_leather_green ['leather'] 1144. 155.   152.    19 rt
## 12 boot_leather_green ['leather'] 1139. 118.   115.    23 rt
## 13 jacket_leather_purple ['leather'] 1135. 141.   157.    23 rt
## 14 pitcher_metal_blue ['metal'] 1134. 138.   142.    24 rt
## 15 jacket_denim_purple ['blue'] 1132. 138.   154.    23 rt
```

```
## # A tibble: 15 x 7
##   label          feature    Mean CILow CIHigh count group
##   <fct>         <fct>      <dbl> <dbl>  <dbl> <int> <chr>
## 1 spoon_plastic_original ['red'] 878.  92.9  94.6    24 rt
## 2 cup_metal_blue        ['blue'] 877.  81.2  86.8    22 rt
## 3 pitcher_glass_green    ['wood'] 877.  72.4  82.0    24 rt
## 4 chair_plastic_green    ['green'] 874.  84.9  89.9    24 rt
## 5 table_metal_blue       ['blue'] 873.  94.8  104.    23 rt
## 6 plate_plastic_original ['blue'] 873. 106.   113.    19 rt
## 7 pitcher_metal_green    ['green'] 872.  87.5  92.1    24 rt
## 8 box_cardboard_original ['cardboard'] 866.  92.7  105.    19 rt
## 9 chair_metal_original   ['paper'] 863. 121.   115.    19 rt
## 10 boot_leather_green    ['green'] 863.  85.8  79.7    24 rt
## 11 cup_plastic_blue      ['blue'] 861.  81.2  90.1    20 rt
## 12 cup_plastic_green     ['green'] 860.  91.8  98.5    22 rt
## 13 plate_plastic_green   ['green'] 853.  88.5  113.    24 rt
## 14 spoon_metal_original  ['pink'] 829.  64.4  64.4    24 rt
## 15 spoon_plastic_blue    ['blue'] 821.  60.9  68.0    24 rt
```

Only correct responses, regardless of feature matching

```
## # A tibble: 15 x 7
##   label          feature    Mean CILow CIHigh count group
##   <fct>         <fct>      <dbl> <dbl>  <dbl> <int> <chr>
## 1 bowl_metal_green      ['silver'] 1246. 156.   157.     7 correct_rt
## 2 bottle_plastic_blue   ['glass'] 1232. 165.   177.    15 correct_rt
## 3 jacket_leather_green   ['denim'] 1205. 106.   115.    15 correct_rt
## 4 spoon_wood_green       ['plastic'] 1200. 172.   187.     9 correct_rt
```

```
## 5 jacket_denim_purple      ['denim']    1196.  133.  145.    20 correct_rt
## 6 chair_metal_purple      ['metal']    1185.  126.  142.    22 correct_rt
## 7 jacket_leather_original  ['rubber']   1176.  118.  115.    22 correct_rt
## 8 jacket_leather_purple   ['leather']  1173.  149.  164.    18 correct_rt
## 9 table_metal_blue        ['metal']    1171.  160.  171.    10 correct_rt
## 10 chair_metal_purple     ['plastic']  1169.  159.  159.    16 correct_rt
## 11 bottle_glass_original  ['plastic']  1149.  160.  178.    19 correct_rt
## 12 boot_leather_green     ['leather']  1144.  102.  113.    20 correct_rt
## 13 bowl_glass_green       ['blue']     1143.  113.  119.    22 correct_rt
## 14 pitcher_plastic_original ['plastic']  1141.  159.  172.    19 correct_rt
## 15 boot_leather_brown     ['rubber']   1134.  102.  98.3    20 correct_rt
```

```
## # A tibble: 15 x 7
```

	label	feature	Mean	CILow	CIHigh	count	group
	<fct>	<fct>	<dbl>	<dbl>	<dbl>	<int>	<chr>
## 1	cup_plastic_original	['clear']	878.	70.3	83.2	23	correct_rt
## 2	cup_metal_blue	['blue']	877.	83.6	89.3	22	correct_rt
## 3	pitcher_glass_green	['wood']	877.	68.8	88.9	24	correct_rt
## 4	chair_plastic_green	['green']	874.	81.8	91.7	24	correct_rt
## 5	table_metal_blue	['blue']	873.	100.	112.	23	correct_rt
## 6	pitcher_metal_green	['green']	872.	90.8	93.9	24	correct_rt
## 7	box_cardboard_original	['cardboard']	866.	91.7	113.	19	correct_rt
## 8	chair_metal_original	['paper']	863.	113.	109.	19	correct_rt
## 9	boot_leather_green	['green']	863.	79.0	79.0	24	correct_rt
## 10	cup_plastic_blue	['blue']	861.	81.6	87.8	20	correct_rt
## 11	cup_plastic_green	['green']	860.	93.3	104.	22	correct_rt
## 12	plate_plastic_green	['green']	848.	94.5	105.	23	correct_rt
## 13	plate_paper_original	['white']	839.	67.4	74.9	21	correct_rt
## 14	spoon_metal_original	['pink']	829.	61.6	72.3	24	correct_rt
## 15	spoon_plastic_blue	['blue']	821.	64.1	63.9	24	correct_rt

### Only correct responses, only matching features

```
## # A tibble: 15 x 7
```

	label	feature	Mean	CILow	CIHigh	count	group
	<fct>	<fct>	<dbl>	<dbl>	<dbl>	<int>	<chr>
## 1	jacket_denim_purple	['denim']	1196.	126.	138.	20	correct_matching~
## 2	chair_metal_purple	['metal']	1185.	134.	144.	22	correct_matching~
## 3	jacket_leather_purple	['leather']	1173.	143.	167.	18	correct_matching~
## 4	table_metal_blue	['metal']	1171.	162.	169.	10	correct_matching~
## 5	boot_leather_green	['leather']	1144.	106.	112.	20	correct_matching~
## 6	pitcher_plastic_origi~	['plastic']	1141.	161.	179.	19	correct_matching~
## 7	jacket_leather_green	['leather']	1127.	147.	140.	17	correct_matching~
## 8	spoon_wood_blue	['wood']	1126.	133.	148.	18	correct_matching~
## 9	pitcher_metal_green	['metal']	1122.	148.	165.	15	correct_matching~
## 10	chair_metal_green	['metal']	1118.	97.5	96.2	21	correct_matching~
## 11	table_metal_green	['metal']	1115.	156.	174.	16	correct_matching~
## 12	boot_rubber_brown	['rubber']	1111.	123.	134.	23	correct_matching~
## 13	spoon_metal_green	['metal']	1091.	123.	146.	19	correct_matching~
## 14	chair_plastic_original	['plastic']	1087.	124.	150.	19	correct_matching~
## 15	chair_plastic_purple	['plastic']	1077.	83.7	87.9	20	correct_matching~

```
## # A tibble: 15 x 7
```

	label	feature	Mean	CILow	CIHigh	count	group
	<fct>	<fct>	<dbl>	<dbl>	<dbl>	<int>	<chr>
## 1	bottle_glass_green	['glass']	884.	86.5	86.4	24	correct_matching~

##	2	plate_plastic_origin~	['blue']	880.	103.	128.	18	correct_matching~
##	3	bag_plastic_blue	['plastic']	879.	110.	106.	16	correct_matching~
##	4	cup_plastic_original	['clear']	878.	76.1	80.5	23	correct_matching~
##	5	cup_metal_blue	['blue']	877.	85.5	88.3	22	correct_matching~
##	6	chair_plastic_green	['green']	874.	82.1	88.3	24	correct_matching~
##	7	table_metal_blue	['blue']	873.	93.7	104.	23	correct_matching~
##	8	pitcher_metal_green	['green']	872.	89.5	93.5	24	correct_matching~
##	9	box_cardboard_origin~	['cardboard~	866.	96.6	104.	19	correct_matching~
##	10	boot_leather_green	['green']	863.	79.2	76.8	24	correct_matching~
##	11	cup_plastic_blue	['blue']	861.	85.8	89.8	20	correct_matching~
##	12	cup_plastic_green	['green']	860.	95.4	90.8	22	correct_matching~
##	13	plate_plastic_green	['green']	848.	99.6	115.	23	correct_matching~
##	14	plate_paper_original	['white']	839.	66.1	76.3	21	correct_matching~
##	15	spoon_plastic_blue	['blue']	821.	64.3	65.9	24	correct_matching~

Only correct responses, only not matching features

```
## # A tibble: 15 x 7
##   label          feature    Mean CILow CIHigh count group
##   <fct>         <fct>      <dbl> <dbl> <dbl> <int> <chr>
## 1 bowl_metal_green  ['silver'] 1246. 154. 145     7 correct_notmatchi~
## 2 bottle_plastic_blue  ['glass'] 1232 173. 170.    15 correct_notmatchi~
## 3 jacket_leather_green  ['denim'] 1205. 104. 121.    15 correct_notmatchi~
## 4 spoon_wood_green     ['plastic'] 1200. 166. 174.     9 correct_notmatchi~
## 5 jacket_leather_orig~  ['rubber'] 1176. 110. 117.    22 correct_notmatchi~
## 6 chair_metal_purple   ['plastic'] 1169. 155. 156.    16 correct_notmatchi~
## 7 bottle_glass_origin~  ['plastic'] 1149. 162. 174.    19 correct_notmatchi~
## 8 bowl_glass_green     ['blue'] 1143. 122. 122.    22 correct_notmatchi~
## 9 boot_leather_brown   ['rubber'] 1134. 98.2 98.9    20 correct_notmatchi~
## 10 spoon_wood_original  ['cardboard~ 1107 106. 115.    22 correct_notmatchi~
## 11 chair_plastic_origi~  ['wood'] 1095. 99.5 99.3    18 correct_notmatchi~
## 12 plate_paper_green    ['glass'] 1094. 119. 133.    20 correct_notmatchi~
## 13 spoon_wood_original  ['clear'] 1093. 106. 113.    22 correct_notmatchi~
## 14 chair_metal_purple   ['silver'] 1091 143. 164.    19 correct_notmatchi~
## 15 bag_plastic_blue     ['purple'] 1091. 130. 148.    23 correct_notmatchi~
```

```
## # A tibble: 15 x 7
##   label          feature    Mean CILow CIHigh count group
##   <fct>         <fct>      <dbl> <dbl> <dbl> <int> <chr>
## 1 box_cardboard_green  ['denim'] 902. 66.4 66.0    23 correct_notmatchin~
## 2 boot_rubber_brown    ['silver'] 900. 87.5 86.4    22 correct_notmatchin~
## 3 bowl_metal_blue      ['wood'] 900. 102. 112.    24 correct_notmatchin~
## 4 bottle_glass_origin~  ['brown'] 897. 71.9 81.4    23 correct_notmatchin~
## 5 bowl_metal_original  ['wood'] 895. 91.4 99.4    19 correct_notmatchin~
## 6 jacket_leather_purp~  ['red'] 894. 75.5 86.5    22 correct_notmatchin~
## 7 table_metal_green    ['paper'] 891. 79.0 87.5    18 correct_notmatchin~
## 8 boot_rubber_original  ['red'] 891. 89.9 87.5    22 correct_notmatchin~
## 9 bottle_plastic_green  ['cardboar~ 883. 85.1 84.6    20 correct_notmatchin~
## 10 boot_leather_green   ['pink'] 880. 92.2 110.    19 correct_notmatchin~
## 11 bag_paper_blue       ['glass'] 879. 78.1 87.5    19 correct_notmatchin~
## 12 spoon_plastic_origi~  ['red'] 878. 95.0 93.5    24 correct_notmatchin~
## 13 pitcher_glass_green  ['wood'] 877. 76.3 82.8    24 correct_notmatchin~
## 14 chair_metal_original  ['paper'] 863. 116. 116.    19 correct_notmatchin~
## 15 spoon_metal_original  ['pink'] 829. 58.8 61.5    24 correct_notmatchin~
```

## By error rates

Regardless of feature matching

```
## # A tibble: 15 x 7
##   label          feature      Mean CILow CIHigh count group
##   <fct>         <fct>      <dbl> <dbl>  <dbl> <int> <chr>
## 1 boot_rubber_original ['green']  0      0      0      24 er
## 2 pitcher_glass_blue  ['clear']  0      0      0      23 er
## 3 bowl_metal_green    ['silver'] 0.318 0.182 0.182  22 er
## 4 spoon_wood_green    ['plastic'] 0.474 0.211 0.211  19 er
## 5 table_metal_blue    ['metal']  0.526 0.211 0.211  19 er
## 6 pitcher_glass_blue  ['plastic'] 0.565 0.217 0.217  23 er
## 7 bottle_plastic_blue ['glass']  0.625 0.167 0.208  24 er
## 8 pitcher_metal_blue  ['metal']  0.625 0.168 0.167  24 er
## 9 jacket_leather_green ['denim']  0.652 0.174 0.174  23 er
## 10 chair_metal_purple  ['plastic'] 0.667 0.208 0.167  24 er
## 11 table_metal_green   ['metal']  0.667 0.208 0.167  24 er
## 12 pitcher_metal_green ['metal']  0.682 0.227 0.182  22 er
## 13 plate_paper_green   ['paper']  0.7    0.200 0.2    20 er
## 14 spoon_metal_blue    ['metal']  0.7    0.200 0.2    20 er
## 15 bottle_glass_blue   ['plastic'] 0.714 0.190 0.190  21 er
```

```
## # A tibble: 15 x 7
##   label          feature      Mean CILow CIHigh count group
##   <fct>         <fct>      <dbl> <dbl>  <dbl> <int> <chr>
## 1 spoon_plastic_blue   ['plastic']  1      0      0      23 er
## 2 spoon_plastic_green  ['pink']    1      0      0      22 er
## 3 spoon_plastic_original ['denim']   1      0      0      22 er
## 4 spoon_plastic_original ['plastic']  1      0      0      19 er
## 5 spoon_plastic_original ['red']     1      0      0      24 er
## 6 spoon_wood_original  ['brown']   1      0      0      20 er
## 7 table_metal_blue     ['blue']    1      0      0      23 er
## 8 table_metal_blue     ['green']   1      0      0      24 er
## 9 table_metal_green    ['blue']    1      0      0      24 er
## 10 table_metal_green    ['green']   1      0      0      23 er
## 11 table_metal_green    ['paper']   1      0      0      18 er
## 12 table_wood_blue     ['leather'] 1      0      0      23 er
## 13 table_wood_original  ['brown']   1      0      0      24 er
## 14 table_wood_original  ['plastic'] 1      0      0      23 er
## 15 table_wood_original  ['wood']    1      0      0      20 er
```

Only matching features

```
## # A tibble: 15 x 7
##   label          feature      Mean CILow CIHigh count group
##   <fct>         <fct>      <dbl> <dbl>  <dbl> <int> <chr>
## 1 boot_rubber_original ['green']  0      0      0      24 matching_er
## 2 table_metal_blue     ['metal']  0.526 0.211 0.211  19 matching_er
## 3 pitcher_metal_blue   ['metal']  0.625 0.208 0.208  24 matching_er
## 4 table_metal_green    ['metal']  0.667 0.167 0.167  24 matching_er
## 5 pitcher_metal_green  ['metal']  0.682 0.227 0.182  22 matching_er
## 6 plate_paper_green    ['paper']  0.7    0.200 0.2    20 matching_er
## 7 spoon_metal_blue     ['metal']  0.7    0.200 0.2    20 matching_er
## 8 spoon_wood_blue      ['blue']   0.739 0.174 0.174  23 matching_er
## 9 bowl_metal_green     ['green']  0.75   0.167 0.167  24 matching_er
```

```
## 10 plate_plastic_original ['plastic'] 0.75 0.167 0.167 24 matching_er
## 11 bag_paper_green ['paper'] 0.783 0.174 0.174 23 matching_er
## 12 jacket_leather_purple ['leather'] 0.783 0.174 0.130 23 matching_er
## 13 plate_paper_blue ['paper'] 0.783 0.174 0.130 23 matching_er
## 14 spoon_wood_blue ['wood'] 0.783 0.174 0.174 23 matching_er
## 15 table_metal_original ['metal'] 0.783 0.174 0.130 23 matching_er

## # A tibble: 15 x 7
##   label          feature      Mean CILow CIHigh count group
##   <fct>          <fct>      <dbl> <dbl> <dbl> <int> <chr>
## 1 pitcher_metal_blue ['blue']      1      0      0     21 matching_er
## 2 pitcher_metal_green ['green']      1      0      0     24 matching_er
## 3 pitcher_plastic_blue ['plastic']    1      0      0     24 matching_er
## 4 pitcher_plastic_green ['green']      1      0      0     23 matching_er
## 5 pitcher_plastic_original ['white']      1      0      0     23 matching_er
## 6 spoon_metal_blue ['blue']      1      0      0     23 matching_er
## 7 spoon_metal_original ['silver']      1      0      0     22 matching_er
## 8 spoon_plastic_blue ['blue']      1      0      0     24 matching_er
## 9 spoon_plastic_blue ['plastic']    1      0      0     23 matching_er
## 10 spoon_plastic_original ['plastic']    1      0      0     19 matching_er
## 11 spoon_wood_original ['brown']      1      0      0     20 matching_er
## 12 table_metal_blue ['blue']      1      0      0     23 matching_er
## 13 table_metal_green ['green']      1      0      0     23 matching_er
## 14 table_wood_original ['brown']      1      0      0     24 matching_er
## 15 table_wood_original ['wood']      1      0      0     20 matching_er
```

#### Only not matching features

```
## # A tibble: 15 x 7
##   label          feature      Mean CILow CIHigh count group
##   <fct>          <fct>      <dbl> <dbl> <dbl> <int> <chr>
## 1 pitcher_glass_blue ['clear']      0      0      0     23 notmatching_er
## 2 bowl_metal_green ['silver'] 0.318 0.182 0.227     22 notmatching_er
## 3 spoon_wood_green ['plastic'] 0.474 0.211 0.211     19 notmatching_er
## 4 pitcher_glass_blue ['plastic'] 0.565 0.217 0.217     23 notmatching_er
## 5 bottle_plastic_blue ['glass'] 0.625 0.208 0.208     24 notmatching_er
## 6 jacket_leather_green ['denim'] 0.652 0.174 0.217     23 notmatching_er
## 7 chair_metal_purple ['plastic'] 0.667 0.167 0.168     24 notmatching_er
## 8 bottle_glass_blue ['plastic'] 0.714 0.190 0.190     21 notmatching_er
## 9 table_metal_original ['black'] 0.75 0.200 0.15     20 notmatching_er
## 10 jacket_denim_purple ['blue'] 0.783 0.174 0.130     23 notmatching_er
## 11 pitcher_plastic_blue ['rubber'] 0.826 0.174 0.130     23 notmatching_er
## 12 pitcher_plastic_original ['rubber'] 0.826 0.174 0.130     23 notmatching_er
## 13 bag_plastic_green ['rubber'] 0.85 0.15 0.15     20 notmatching_er
## 14 chair_metal_green ['clear'] 0.85 0.200 0.15     20 notmatching_er
## 15 bottle_glass_original ['plastic'] 0.864 0.136 0.136     22 notmatching_er

## # A tibble: 15 x 7
##   label          feature      Mean CILow CIHigh count group
##   <fct>          <fct>      <dbl> <dbl> <dbl> <int> <chr>
## 1 plate_plastic_pink ['silver']      1      0      0     20 notmatching_er
## 2 spoon_metal_blue ['paper']      1      0      0     23 notmatching_er
## 3 spoon_metal_blue ['pink']      1      0      0     24 notmatching_er
## 4 spoon_metal_green ['black']      1      0      0     20 notmatching_er
## 5 spoon_metal_green ['paper']      1      0      0     24 notmatching_er
## 6 spoon_metal_original ['pink']      1      0      0     24 notmatching_er
```

```
## 7 spoon_metal_original ['wood'] 1 0 0 19 notmatching_er
## 8 spoon_plastic_green ['pink'] 1 0 0 22 notmatching_er
## 9 spoon_plastic_original ['denim'] 1 0 0 22 notmatching_er
## 10 spoon_plastic_original ['red'] 1 0 0 24 notmatching_er
## 11 table_metal_blue ['green'] 1 0 0 24 notmatching_er
## 12 table_metal_green ['blue'] 1 0 0 24 notmatching_er
## 13 table_metal_green ['paper'] 1 0 0 18 notmatching_er
## 14 table_wood_blue ['leather'] 1 0 0 23 notmatching_er
## 15 table_wood_original ['plastic'] 1 0 0 23 notmatching_er
```

#Is there overlap?

```
## # A tibble: 49 x 3
## # Groups:   label [36]
##   label          feature    count
##   <fct>         <fct>    <int>
## 1 bag_paper_green ['paper']      1
## 2 bag_plastic_blue ['purple']     1
## 3 bag_plastic_green ['rubber']     1
## 4 boot_leather_brown ['rubber']     3
## 5 boot_leather_green ['leather']    3
## 6 boot_rubber_brown ['rubber']     1
## 7 boot_rubber_original ['green']      2
## 8 bottle_glass_blue ['plastic']     2
## 9 bottle_glass_original ['plastic']    3
## 10 bottle_plastic_blue ['glass']      4
## # ... with 39 more rows
```