

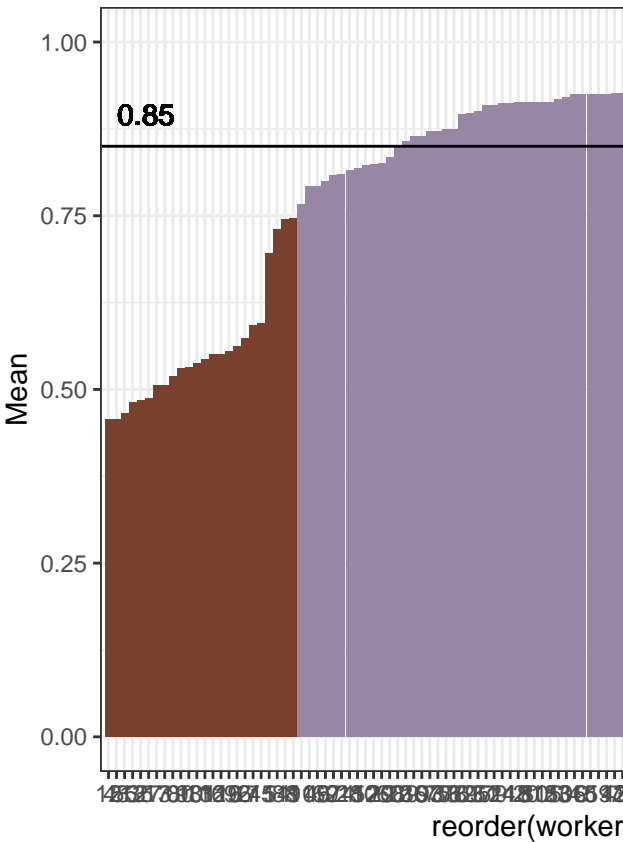
Perceptual Difficulty - Randomized and Timed Perceptibility2 (difficulty analysis)

Stimuli check

```
##
##      color material
##   no      81      81
##   yes     81      81
```

Exclusions Participants whose native language is not English are excluded

```
##   workerid language
## 1         57  Chinese
## 2         82
## 3         90  Spanish
```



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

```
## # A tibble: 24 x 7
##   workerid Mean CILow CIHigh YMin YMax lowacc
##   <int> <dbl> <dbl> <dbl> <dbl> <dbl> <chr>
## 1         0 0.519 0.111 0.0991 0.407 0.618 1
## 2         1 0.746 0.119 0.104 0.627 0.851 1
```

```
## 3      3 0.506 0.101 0.114 0.405 0.620 1
## 4      6 0.573 0.12 0.12 0.453 0.693 1
## 5      7 0.593 0.123 0.111 0.469 0.704 1
## 6     12 0.457 0.111 0.111 0.346 0.568 1
## 7     13 0.481 0.114 0.101 0.367 0.582 1
## 8     16 0.556 0.127 0.111 0.429 0.667 1
## 9     17 0.506 0.111 0.111 0.395 0.617 1
## 10    27 0.488 0.112 0.100 0.375 0.588 1
## # ... with 14 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 chair_wood_green    blue    1979     0     0     1 rt
## 2 bag_paper_green     cardboard 1962     0     0     1 rt
## 3 spoon_wood_green    leather  1955     0     0     1 rt
## 4 plate_paper_blue    clear   1919     0     0     1 rt
## 5 table_metal_silver_original brown   1905     0     0     1 rt
## 6 cup_metal_silver_original cardboard 1831     0     0     1 rt
## 7 boot_rubber_black_original red     1819     0     0     1 rt
## 8 bottle_glass_green  paper   1816     0     0     1 rt
## 9 table_metal_green   white   1815     0     0     1 rt
## 10 table_wood_brown_original silver  1750.  140.  140.     2 rt
## 11 bag_plastic_white_original silver  1737     0     0     1 rt
## 12 spoon_wood_green    red     1732     0     0     1 rt
## 13 chair_plastic_purple glass    1727     0     0     1 rt
## 14 chair_plastic_blue_original green    1716     0     0     1 rt
## 15 jacket_denim_blue_original clear    1706     0     0     1 rt

## # A tibble: 15 x 7
##   label          feature    Mean CILow CIHigh count group
##   <fct>         <fct>    <dbl> <dbl>  <dbl> <int> <chr>
## 1 box_cardboard_brown_original rubber    677     0     0     1 rt
## 2 pitcher_glass_blue    brown    663    75    75     2 rt
## 3 spoon_plastic_blue    yellow   662.  50.5  50.5     2 rt
## 4 bottle_glass_blue     plastic   647  628  373     3 rt
## 5 bag_plastic_green     rubber    642     0     0     1 rt
## 6 cup_plastic_green     brown    635     0     0     1 rt
## 7 bottle_glass_green    pink     632     0     0     1 rt
## 8 jacket_denim_green    purple    631     0     0     1 rt
## 9 bottle_plastic_blue   wood     629     0     0     1 rt
## 10 cup_plastic_green    red      625     0     0     1 rt
## 11 pitcher_glass_green  yellow    620     0     0     1 rt
## 12 jacket_leather_purple white    606.  57.5  57.5     2 rt
## 13 bag_plastic_blue     pink     598.  298.  191.     4 rt
## 14 bowl_metal_silver_original cardboard  576     0     0     1 rt
## 15 bottle_plastic_green blue      574     0     0     1 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 chair_wood_green      blue      1979     0     0         1 correct_rt
## 2 bag_paper_green        cardboard 1962     0     0         1 correct_rt
## 3 spoon_wood_green       leather   1955     0     0         1 correct_rt
## 4 plate_paper_blue       clear     1919     0     0         1 correct_rt
## 5 table_metal_silver_original brown     1905     0     0         1 correct_rt
## 6 cup_metal_silver_original cardboard 1831     0     0         1 correct_rt
## 7 boot_rubber_black_original red       1819     0     0         1 correct_rt
## 8 bottle_glass_green     paper     1816     0     0         1 correct_rt
## 9 table_metal_green      white     1815     0     0         1 correct_rt
## 10 bottle_glass_blue     clear     1810     83    83         2 correct_rt
## 11 table_wood_brown_original silver    1750.   140.   140.         2 correct_rt
## 12 bag_plastic_white_original silver    1737     0     0         1 correct_rt
## 13 spoon_wood_green       red       1732     0     0         1 correct_rt
## 14 chair_plastic_purple   glass     1727     0     0         1 correct_rt
## 15 chair_plastic_blue_original green     1716     0     0         1 correct_rt
```

```
## # A tibble: 15 x 7
##   label                feature    Mean CILow CIHigh count group
##   <fct>                <fct>    <dbl> <dbl>  <dbl> <int> <chr>
## 1 table_wood_green       paper     683     0     0         1 correct_rt
## 2 box_cardboard_brown_original rubber     677     0     0         1 correct_rt
## 3 pitcher_glass_blue     brown     663    75    75         2 correct_rt
## 4 spoon_plastic_blue     yellow    662.   50.5   50.5         2 correct_rt
## 5 bag_plastic_green      rubber    642     0     0         1 correct_rt
## 6 cup_plastic_green      brown    635     0     0         1 correct_rt
## 7 bottle_glass_green     pink     632     0     0         1 correct_rt
## 8 jacket_denim_green     purple    631     0     0         1 correct_rt
## 9 bottle_plastic_blue    wood     629     0     0         1 correct_rt
## 10 cup_plastic_green     red      625     0     0         1 correct_rt
## 11 pitcher_glass_green    yellow    620     0     0         1 correct_rt
## 12 jacket_leather_purple  white    606.   57.5   57.5         2 correct_rt
## 13 plate_paper_white_original red       603     0     0         1 correct_rt
## 14 table_metal_silver_original pink     593     0     0         1 correct_rt
## 15 bottle_plastic_green   blue     574     0     0         1 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 table_metal_green      metal    1316. 191.   228.         12 correct_matching~
## 2 table_metal_blue       metal    1305. 202.   217.         14 correct_matching~
## 3 chair_metal_purple     metal    1282. 135.   144.         19 correct_matching~
## 4 table_wood_green       wood     1206. 118.   125.         23 correct_matching~
## 5 table_metal_silver_ordin~ metal    1185. 149.   147.         15 correct_matching~
## 6 jacket_leather_purple  leather  1185. 179.   182.         17 correct_matching~
## 7 chair_metal_green      metal    1181. 152.   148.         19 correct_matching~
## 8 boot_leather_green     leather  1174. 126.   125.         19 correct_matching~
## 9 chair_metal_silver_ordin~ metal    1165. 149.   165.         24 correct_matching~
## 10 spoon_metal_green     metal    1161. 171.   169.         18 correct_matching~
## 11 chair_wood_purple      wood     1157. 166.   173.         21 correct_matching~
## 12 table_wood_blue       wood     1156. 147.   155.         25 correct_matching~
```

```
## 13 plate_paper_blue          paper  1149. 154.  149.    16 correct_matching~
## 14 bottle_glass_blue        glass  1147. 124.  134.    21 correct_matching~
## 15 jacket_denim_green       denim  1146.  89.3  98.2    17 correct_matching~
```

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

```
##   label          feature    Mean CILow CIHigh count group
##   <fct>         <fct>    <dbl> <dbl>  <dbl> <int> <chr>
## 1 box_cardboard_brown_orig~ cardboard 936.  95.2  114.    23 correct_matchin~
## 2 box_wood_brown_original   wood     936.  86.6  105.    23 correct_matchin~
## 3 bottle_plastic_green      green     935. 103.   109.    18 correct_matchin~
## 4 bowl_metal_silver_origin~ metal     934. 102.   121.    22 correct_matchin~
## 5 table_wood_brown_original wood     928. 101.   105.    25 correct_matchin~
## 6 jacket_denim_purple       purple    922.  87.3   84.8    20 correct_matchin~
## 7 table_metal_blue          blue     922.  95.2  104.    25 correct_matchin~
## 8 cup_plastic_blue          plastic    918.  80.8   82.2    26 correct_matchin~
## 9 cup_plastic_clear_origin~ clear     917.  98.0  115.    21 correct_matchin~
## 10 pitcher_metal_blue        blue     915.  91.1  106.    19 correct_matchin~
## 11 cup_plastic_green         green     911. 112.   138.    20 correct_matchin~
## 12 bottle_glass_green        green     903.  81.0   86.5    19 correct_matchin~
## 13 chair_plastic_blue_origi~ blue     890.  80.5   85.2    18 correct_matchin~
## 14 table_wood_brown_original brown     876.  60.7   70.4    22 correct_matchin~
## 15 plate_plastic_blue_origi~ blue     875.  95.0  102.    24 correct_matchin~
```

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 chair_wood_green         blue  1979     0     0     1 correct_notmatchi~
## 2 bag_paper_green         cardboard 1962     0     0     1 correct_notmatchi~
## 3 spoon_wood_green        leather  1955     0     0     1 correct_notmatchi~
## 4 plate_paper_blue        clear    1919     0     0     1 correct_notmatchi~
## 5 table_metal_silver_ori~ brown    1905     0     0     1 correct_notmatchi~
## 6 cup_metal_silver_origi~ cardboard 1831     0     0     1 correct_notmatchi~
## 7 boot_rubber_black_orig~ red     1819     0     0     1 correct_notmatchi~
## 8 bottle_glass_green       paper    1816     0     0     1 correct_notmatchi~
## 9 table_metal_green        white    1815     0     0     1 correct_notmatchi~
## 10 bottle_glass_blue       clear    1810    83    83     2 correct_notmatchi~
## 11 table_wood_brown_origi~ silver  1750.  140.  140.    2 correct_notmatchi~
## 12 bag_plastic_white_orig~ silver  1737     0     0     1 correct_notmatchi~
## 13 spoon_wood_green        red     1732     0     0     1 correct_notmatchi~
## 14 chair_plastic_purple     glass  1727     0     0     1 correct_notmatchi~
## 15 chair_plastic_blue_ori~ green   1716     0     0     1 correct_notmatchi~
```

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

```
##   label          feature    Mean CILow CIHigh count group
##   <fct>         <fct>    <dbl> <dbl>  <dbl> <int> <chr>
## 1 table_wood_green         paper    683     0     0     1 correct_notmatchin~
## 2 box_cardboard_brown_ori~ rubber    677     0     0     1 correct_notmatchin~
## 3 pitcher_glass_blue       brown    663    75    75     2 correct_notmatchin~
## 4 spoon_plastic_blue       yellow   662.  50.5  50.5    2 correct_notmatchin~
## 5 bag_plastic_green        rubber    642     0     0     1 correct_notmatchin~
## 6 cup_plastic_green        brown    635     0     0     1 correct_notmatchin~
## 7 bottle_glass_green       pink     632     0     0     1 correct_notmatchin~
## 8 jacket_denim_green       purple    631     0     0     1 correct_notmatchin~
## 9 bottle_plastic_blue      wood     629     0     0     1 correct_notmatchin~
```

```
## 10 cup_plastic_green      red      625      0      0      1 correct_notmatchin~
## 11 pitcher_glass_green    yellow    620      0      0      1 correct_notmatchin~
## 12 jacket_leather_purple  white    606.    57.5    57.5    2 correct_notmatchin~
## 13 plate_paper_white_origi~ red      603      0      0      1 correct_notmatchin~
## 14 table_metal_silver_orig~ pink     593      0      0      1 correct_notmatchin~
## 15 bottle_plastic_green   blue     574      0      0      1 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 bag_paper_blue      red          0      0      0      1 er
## 2 bag_plastic_blue    leather       0      0      0      1 er
## 3 bag_plastic_blue    paper         0      0      0      1 er
## 4 bag_plastic_blue    purple        0      0      0      1 er
## 5 bag_plastic_green    paper         0      0      0      3 er
## 6 boot_leather_green   black         0      0      0      1 er
## 7 boot_rubber_brown    black         0      0      0      1 er
## 8 boot_rubber_brown    leather       0      0      0      1 er
## 9 bottle_plastic_clear~ white         0      0      0      2 er
## 10 bottle_plastic_green clear          0      0      0      1 er
## 11 bowl_glass_green     clear          0      0      0      2 er
## 12 bowl_metal_silver_original cardboard      0      0      0      1 er
## 13 box_cardboard_blue   paper         0      0      0      5 er
## 14 box_cardboard_blue   silver        0      0      0      1 er
## 15 box_wood_brown_original glass          0      0      0      1 er
```

```
## # A tibble: 15 x 7
##   label          feature    Mean CILow CIHigh count group
##   <fct>         <fct>    <dbl> <dbl>  <dbl> <int> <chr>
## 1 table_wood_green     black         1      0      0      2 er
## 2 table_wood_green     blue          1      0      0      4 er
## 3 table_wood_green     clear         1      0      0      1 er
## 4 table_wood_green     denim         1      0      0      3 er
## 5 table_wood_green     glass         1      0      0      2 er
## 6 table_wood_green     green         1      0      0     25 er
## 7 table_wood_green     leather       1      0      0      5 er
## 8 table_wood_green     metal         1      0      0      3 er
## 9 table_wood_green     paper         1      0      0      1 er
## 10 table_wood_green    pink          1      0      0      1 er
## 11 table_wood_green    plastic       1      0      0      2 er
## 12 table_wood_green    purple        1      0      0      4 er
## 13 table_wood_green    silver        1      0      0      3 er
## 14 table_wood_green    white         1      0      0      3 er
## 15 table_wood_green    yellow       1      0      0      1 er
```

Only matching features

```
## # A tibble: 15 x 7
##   label          feature    Mean CILow CIHigh count group
##   <fct>         <fct>    <dbl> <dbl>  <dbl> <int> <chr>
```

```
## 1 table_metal_green      metal  0.6  0.25  0.2    20 matching_er
## 2 table_metal_blue       metal  0.636 0.182 0.182    22 matching_er
## 3 plate_paper_blue       paper  0.667 0.208 0.167    24 matching_er
## 4 spoon_wood_green       wood   0.667 0.167 0.167    24 matching_er
## 5 boot_rubber_brown      rubber 0.72  0.160 0.16    25 matching_er
## 6 spoon_wood_blue        wood   0.737 0.211 0.211    19 matching_er
## 7 bowl_glass_blue        glass  0.75  0.200 0.200    20 matching_er
## 8 table_metal_silver_original metal 0.75  0.200 0.15    20 matching_er
## 9 chair_metal_purple     metal 0.76  0.16  0.16    25 matching_er
## 10 jacket_denim_purple   denim  0.76  0.200 0.16    25 matching_er
## 11 plate_plastic_green   plastic 0.789 0.211 0.158    19 matching_er
## 12 boot_rubber_green     green  0.792 0.167 0.167    24 matching_er
## 13 spoon_wood_blue       blue   0.792 0.167 0.167    24 matching_er
## 14 bowl_metal_blue       metal  0.8   0.16  0.12    25 matching_er
## 15 bowl_metal_green      green  0.8   0.16  0.12    25 matching_er
```

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

```
##   label      feature  Mean CILow CIHigh count group
##   <fct>      <fct>    <dbl> <dbl> <dbl> <int> <chr>
## 1 pitcher_metal_green green      1      0      0     25 matching_er
## 2 pitcher_metal_green metal      1      0      0     19 matching_er
## 3 pitcher_plastic_blue plastic     1      0      0     26 matching_er
## 4 plate_paper_blue   blue      1      0      0     25 matching_er
## 5 plate_paper_green   green     1      0      0     26 matching_er
## 6 plate_paper_white_original white     1      0      0     25 matching_er
## 7 plate_plastic_blue_original blue      1      0      0     24 matching_er
## 8 plate_plastic_green green      1      0      0     25 matching_er
## 9 spoon_metal_silver_original metal     1      0      0     24 matching_er
## 10 spoon_metal_silver_original silver     1      0      0     20 matching_er
## 11 spoon_plastic_green green      1      0      0     25 matching_er
## 12 table_wood_blue    blue      1      0      0     27 matching_er
## 13 table_wood_blue    wood      1      0      0     25 matching_er
## 14 table_wood_brown_original wood      1      0      0     25 matching_er
## 15 table_wood_green   green     1      0      0     25 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 bag_paper_blue     red      0      0      0      1 notmatching_~
## 2 bag_plastic_blue   leather  0      0      0      1 notmatching_~
## 3 bag_plastic_blue   paper    0      0      0      1 notmatching_~
## 4 bag_plastic_blue   purple   0      0      0      1 notmatching_~
## 5 bag_plastic_green   paper    0      0      0      3 notmatching_~
## 6 boot_leather_green  black    0      0      0      1 notmatching_~
## 7 boot_rubber_brown   black    0      0      0      1 notmatching_~
## 8 boot_rubber_brown   leather  0      0      0      1 notmatching_~
## 9 bottle_plastic_clear_origin~ white    0      0      0      2 notmatching_~
## 10 bottle_plastic_green clear     0      0      0      1 notmatching_~
## 11 bowl_glass_green   clear     0      0      0      2 notmatching_~
## 12 bowl_metal_silver_original cardboard 0      0      0      1 notmatching_~
## 13 box_cardboard_blue  paper    0      0      0      5 notmatching_~
## 14 box_cardboard_blue  silver   0      0      0      1 notmatching_~
## 15 box_wood_brown_original glass     0      0      0      1 notmatching_~
```

```
## # A tibble: 15 x 7
##   label          feature  Mean CILow CIHigh count group
##   <fct>          <fct>    <dbl> <dbl>  <dbl> <int> <chr>
## 1 table_wood_brown_original white      1     0     0     2 notmatching_er
## 2 table_wood_green      black      1     0     0     2 notmatching_er
## 3 table_wood_green      blue       1     0     0     4 notmatching_er
## 4 table_wood_green      clear      1     0     0     1 notmatching_er
## 5 table_wood_green      denim      1     0     0     3 notmatching_er
## 6 table_wood_green      glass      1     0     0     2 notmatching_er
## 7 table_wood_green      leather    1     0     0     5 notmatching_er
## 8 table_wood_green      metal      1     0     0     3 notmatching_er
## 9 table_wood_green      paper      1     0     0     1 notmatching_er
## 10 table_wood_green     pink       1     0     0     1 notmatching_er
## 11 table_wood_green     plastic    1     0     0     2 notmatching_er
## 12 table_wood_green     purple     1     0     0     4 notmatching_er
## 13 table_wood_green     silver     1     0     0     3 notmatching_er
## 14 table_wood_green     white      1     0     0     3 notmatching_er
## 15 table_wood_green     yellow     1     0     0     1 notmatching_er
```

Is there overlap?

```
## # A tibble: 56 x 3
## # Groups:   label [43]
##   label          feature  count
##   <fct>          <fct>    <int>
## 1 bag_paper_green      cardboard    3
## 2 bag_plastic_white_original silver        3
## 3 boot_rubber_black_original red            3
## 4 bottle_glass_green    paper         3
## 5 chair_plastic_blue_original green          3
## 6 chair_plastic_purple   glass         3
## 7 chair_wood_green      blue          3
## 8 cup_metal_silver_original cardboard       3
## 9 plate_paper_blue      clear         3
## 10 spoon_wood_green      leather       3
## # ... with 46 more rows
```

```
## # A tibble: 60 x 3
## # Groups:   label [34]
##   label          feature count
##   <fct>          <fct>    <int>
## 1 table_wood_green     paper      4
## 2 bag_plastic_green     rubber      3
## 3 bottle_glass_green    pink         3
## 4 bottle_plastic_blue   wood         3
## 5 bottle_plastic_green  blue         3
## 6 box_cardboard_brown_original rubber       3
## 7 cup_plastic_green     brown        3
## 8 cup_plastic_green     red          3
## 9 jacket_denim_green    purple       3
## 10 jacket_leather_purple white        3
## # ... with 50 more rows
```