UNIVERSITY *of* York

This is a repository copy of *When comprehension elicits incomprehension: Deterioration of semantic categorisation in the absence of stimulus repetition*.

**Article:**

White Rose
university consortium
Universities of Leeds, Sheffield & York

eprints@whiterose.ac.uk
https://eprints.whiterose.ac.uk/

**Additional analysis for Experiment 1: Effect of lag between successive targets**

The analysis included data from Experiment 1 (Thematic-matching), at the faster speed of presentation (1.1s), and examined accuracy as a function of the number of distractors since the last target. Results revealed poorer performance towards the end of each category across all lags (see Figure 1). ANOVA on the data revealed a significant main effect of 'within-category' decline: $F (1, 4) = 17.20$, $p = .014$, there was no main effect of 'lag' ($p > .1$), and a trend-level interaction between 'lag' and 'within-category' decline: $F (1, 4) = 14.72$, $p = .064$.
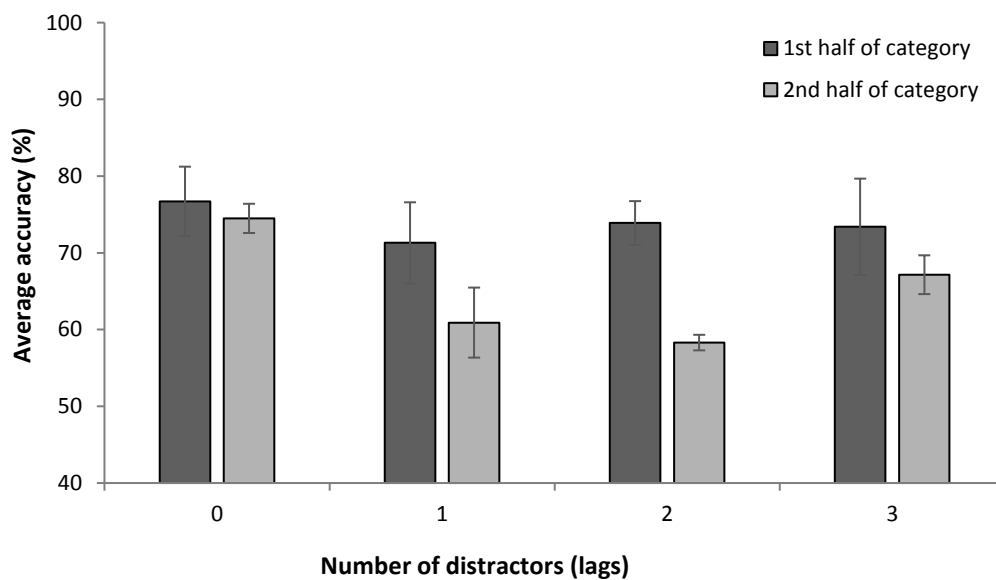


*Figure 1:* Average accuracy based on the number of distractors presented between targets, across the first half and second half of each category and across all participants in Experiment 1 (Thematic-matching). Error bars show *SE* of the mean.

***Table 1:*** Signal detection scores for Experiment 1: Thematic-matching.

| 1.1 seconds | Within-category | Relatedness | Hits | Misses | False Alarms | Correct Rejections | *d'* score | Average RT (SD) |
|---|---|---|---|---|---|---|---|---|
| 1st half of session | 1st half of category | Strong | 60.8 | 39.2 | 6.9 | 93.1 | 1.76 | 816.5 (40.9) |
| | | Weak | 51.4 | 48.6 | 6.9 | 93.1 | 1.52 | 875.6 (61.8) |
| | 2nd half of category | Strong | 51.3 | 48.7 | 5.5 | 94.5 | 1.63 | 833.4 (56.2) |
| | | Weak | 47.9 | 52.1 | 5.5 | 94.5 | 1.55 | 870.8 (67.1) |
| 2nd half of session | 1st half of category | Strong | 60.3 | 39.7 | 6.1 | 93.9 | 1.81 | 821.7 (49.1) |
| | | Weak | 50.5 | 49.5 | 6.1 | 93.9 | 1.56 | 849.8 (54.0) |
| | 2nd half of category | Strong | 45.8 | 54.2 | 4.7 | 95.3 | 1.57 | 835.1 (73.4) |
| | | Weak | 41.8 | 58.2 | 4.7 | 95.3 | 1.47 | 866.7 (26.1) |

| 2 seconds | Within-category | Relatedness | Hits | Misses | False Alarms | Correct Rejections | *d'* score | Average RT (SD) |
|---|---|---|---|---|---|---|---|---|
| 1st half of session | 1st half of category | Strong | 76.4 | 23.6 | 7.3 | 92.7 | 2.17 | 1008 (73.3) |
| | | Weak | 71.4 | 28.6 | 7.3 | 92.7 | 2.01 | 1135 (117.3) |
| | 2nd half of category | Strong | 72.9 | 27.1 | 6.5 | 93.5 | 2.13 | 1060 (84.6) |
| | | Weak | 72.1 | 27.9 | 6.5 | 93.5 | 2.10 | 1155 (117.3) |
| 2nd half of session | 1st half of category | Strong | 74.1 | 25.9 | 5.5 | 94.5 | 2.24 | 1015 (106.4) |
| | | Weak | 55.4 | 44.6 | 5.5 | 94.5 | 1.73 | 1091 (122.4) |
| | 2nd half of category | Strong | 67.9 | 32.1 | 4.7 | 95.3 | 2.14 | 1055 (75.6) |
| | | Weak | 49.6 | 50.4 | 4.7 | 95.3 | 1.67 | 1122 (106.9) |

Footnote: Data expressed as percentages of target-present and target-absent trials. Data were divided into the first and second half of each category, allowing within-category fatigue to be assessed. They were also divided into the first and second half of each experimental session, allowing between-category fatigue to be assessed. These data are broken down into the two presentation speeds and strong/weak targets. The distractors are shared and equally distributed 'within' each category; resulting in an equal number of false alarms and correct rejections for the strong/weak targets. RT reported in milliseconds (standard deviations)

***Table 2:*** Signal detection scores for Experiment 2: Taxonomic-matching.

| Between-category | Within-category | Hits | Misses | False Alarms | Correct Rejections | *d'* score | Average RT (SD) |
|---|---|---|---|---|---|---|---|
| 1st half of session | 1st half of category | 79.7 | 20.3 | 3.1 | 96.9 | 2.81 | 857.5 (29.5) |
| | 2nd half of category | 75.2 | 24.8 | 3.7 | 96.3 | 2.60 | 850.9 (39.7) |
| 2nd half of session | 1st half of category | 79.0 | 21.0 | 3.2 | 96.8 | 2.90 | 867.5 (27.5) |
| | 2nd half of category | 71.9 | 28.1 | 3.9 | 96.1 | 2.50 | 865.9 (38.2) |

Footnote: Data expressed as percentages of target-present and target-absent trials. Data were divided into the first and second half of each category, allowing within-category fatigue to be assessed. They were also divided into the first and second half of each experimental session, allowing between-category fatigue to be assessed. RT reported in milliseconds (standard deviation

***Table 3:*** Signal detection scores for Experiment 3: Feature-matching.

| Between-category | Within-category | Hits | Misses | False Alarms | Correct Rejections | *d'* score | Average RT (SD) |
|---|---|---|---|---|---|---|---|
| 1st half of session | 1st half of category | 58.94 | 44.77 | 7.88 | 92.12 | 1.62 | 887.8 (37.0) |
| | 2nd half of category | 56.70 | 48.30 | 7.29 | 92.71 | 1.59 | 892.4 (52.2) |
| 2nd half of session | 1st half of category | 59.17 | 44.92 | 7.29 | 92.71 | 1.66 | 874.0 (45.2) |
| | 2nd half of category | 52.16 | 52.84 | 7.88 | 92.12 | 1.43 | 878.1 (55.1) |

Footnote: Data expressed as percentages of target-present and target-absent trials. Data were divided into the first and second half of each category, allowing within-category fatigue to be assessed. They were also divided into the first and second half of each experimental session, allowing between-category fatigue to be assessed. RT reported in milliseconds (standard deviations).

*Table 4:* Signal detection scores for Experiment 4: Effect across modalities.

| Modality | Within-category | Hits | Misses | False Alarms | Correct Rejections | *d'* score | Average RT (SD) |
|---|---|---|---|---|---|---|---|
| **Pictures** | 1st half of category | 87.2 | 12.8 | 4.5 | 95.6 | 3.02 | 715 (63.5) |
| | 2nd half of category | 85.7 | 14.3 | 5.6 | 94.4 | 2.97 | 716 (77.6) |
| **Words** | 1st half of category | 88.1 | 11.9 | 8.8 | 91.2 | 2.66 | 948 (38.1) |
| | 2nd half of category | 87.7 | 12.3 | 8.8 | 91.2 | 2.65 | 949 (39.5) |
| **Interleaved Pictures** | 1st half of category | 86.1 | 13.9 | 10.8 | 89.2 | 2.30 | 731 (62.8) |
| | 2nd half of category | 84.3 | 15.7 | 15.7 | 84.3 | 1.97 | 700 (69.2) |
| **Interleaved Words** | 1st half of category | 87.6 | 12.4 | 8.4 | 91.6 | 2.46 | 981 (52.1) |
| | 2nd half of category | 87 | 13 | 10.4 | 89.6 | 2.21 | 982 (60.1) |

Footnote: Data expressed as percentages of target-present and target-absent trials. Data were divided into the first and second half of each category, allowing within-category fatigue to be assessed. They were also divided into the first and second half of each experimental session, allowing between-category fatigue to be assessed, shown individually for the pictures, words and the interleaved (split by pictures and words) modalities. RT reported in milliseconds (standard deviations).

***Table 5:*** Signal detection scores for Experiment 5 (Effect of divided attention)

| Single condition | Within-category | Hits | Misses | False Alarms | Correct Rejections | $d'$ score | Average RT (SD) |
|---|---|---|---|---|---|---|---|
| Strong items | 1st half of category | 77.2 | 22.8 | 5.3 | 94.7 | 2.64 | 840 (42.7) |
| | 2nd half of category | 71.8 | 28.2 | 4.9 | 95.1 | 2.49 | 853 (39.7) |
| Weak items | 1st half of category | 44.8 | 55.2 | 5.3 | 94.7 | 1.67 | 911 (43.6) |
| | 2nd half of category | 39.6 | 60.4 | 4.9 | 95.1 | 1.56 | 920 (46.6) |
| **Dual condition** | **Within-category** | **Hits** | **Misses** | **False Alarms** | **Correct Rejections** | $d'$ **score** | **Average RT (SD)** |
| Strong items | 1st half of category | 76.8 | 23.3 | 5.5 | 94.5 | 2.47 | 852 (43.6) |
| | 2nd half of category | 67.1 | 32.9 | 5.1 | 94.9 | 2.27 | 865 (41.5) |
| Weak items | 1st half of category | 39.5 | 60.5 | 5.5 | 94.5 | 1.39 | 919 (48.8) |
| | 2nd half of category | 38.4 | 61.6 | 5.1 | 94.9 | 1.47 | 924 (48.1) |

Footnote: Data expressed as percentages of target-present and target-absent trials. Data were divided into the first and second half of each category, allowing within-category fatigue to be assessed. They were also divided into the first and second half of each experimental session, allowing between-category fatigue to be assessed. These data are broken down into the two conditions (single/dual) and strong/weak targets. The distractors are shared and equally distributed 'within' each category; resulting in an equal number of false alarms and correct rejections for the strong/weak targets. RT reported in milliseconds (standard deviations).

**Table 6:** Signal detection scores for Experiment 6 (Semantic control deficits in patients with semantic aphasia and age-matched controls)

| SA patients | Relatedness | Within-category | Hits | Misses | False Alarms | Correct rejections | *d'* score |
|---|---|---|---|---|---|---|---|
| Set 1 | Strong | 1st half of category | 87.1 | 12.9 | 9.1 | 90.9 | 2.47 |
| | | 2nd half of category | 86.3 | 13.7 | 7.6 | 92.4 | 2.53 |
| | Weak | 1st half of category | 58.5 | 41.5 | 7.6 | 92.4 | 1.65 |
| | | 2nd half of category | 60.8 | 39.2 | 9.1 | 90.9 | 1.61 |
| Set 2 | Strong | 1st half of category | 85.2 | 14.8 | 8.8 | 91.3 | 2.40 |
| | | 2nd half of category | 84.7 | 15.3 | 8.6 | 91.4 | 2.39 |
| | Weak | 1st half of category | 61.3 | 38.7 | 8.8 | 91.3 | 1.64 |
| | | 2nd half of category | 56.2 | 43.8 | 8.6 | 91.4 | 1.52 |

| Older adults | Relatedness | Within-category | Hits | Misses | False Alarms | Correct rejections | *d'* score |
|---|---|---|---|---|---|---|---|
| Set 1 | Strong | 1st half of category | 94.4 | 5.6 | 10.1 | 89.9 | 2.87 |
| | | 2nd half of category | 95.2 | 4.8 | 8.4 | 91.6 | 3.04 |
| | Weak | 1st half of category | 78.7 | 21.3 | 10.1 | 89.9 | 2.07 |
| | | 2nd half of category | 75.7 | 24.3 | 8.4 | 91.6 | 2.07 |
| Set 2 | Strong | 1st half of category | 94.3 | 5.7 | 9.6 | 90.4 | 2.89 |
| | | 2nd half of category | 94.9 | 5.1 | 9.9 | 90.1 | 2.93 |
| | Weak | 1st half of category | 79.4 | 20.6 | 9.6 | 90.4 | 2.12 |
| | | 2nd half of category | 77.0 | 23.0 | 9.9 | 90.1 | 2.03 |

Footnote: Data expressed as percentages of target-present and target-absent trials. Data were divided into the first and second half of each category, allowing within-category fatigue to be assessed. They were also divided into the first and second half of each experimental session (i.e., 'set'), allowing between-category fatigue to be assessed. These data are broken down into the two groups and strong/weak targets. The distractors are shared and equally distributed 'within' each category; resulting in an equal number of false alarms and correct rejections for the strong/weak target.

| Christmas (LF = 58) | | Bedroom (LF = 81) | | Bathroom (LF = 87) | | Living Room (LF = 94) | | Supermarket (LF = 83) | | Garden (LF = 50) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Strong (51) | Weak (65) | Strong (58) | Weak(103) | Strong (63) | Weak (110) | Strong (36) | Weak (151) | Strong (98) | Weak (67) | Strong (36) | Weak (65) |
| tree | religion | bed | hanger | Bath | tiles | armchair | remote | shop | health | flowers | party |
| card | bible | chamber | chair | scales | house | bookcase | brick | store | provision | lawn | wall |
| cake | reindeer | curtains | books | soap | wallpaper | carpet | fire | basket | street | hose | path |
| pudding | family | carpet | robe | water | brush | cushion | cottage | money | queue | fence | peas |
| December | star | floor | linen | towel | rack | curtains | door | shelf | carrier | grass | hut |
| tinsel | manger | pillow | bunk | sink | bedroom | telephone | house | cash | handbag | shed | pest |
| snow | elves | suite | apartment | toilet | apartment | television | hearth | bargains | container | plant | fete |
| mistletoe | holiday | sheets | house | shower | roll | sofa | shelter | counter | goods | weeds | butterfly |
| cracker | stable | clock | desk | tap | cloth | lamp | ceiling | bag | warehouse | shrub | roots |
| present | queen | slippers | chest | basin | door | magazine | family | food | trade | gate | umbrella |
| Unrelated (LF = 62) | | Unrelated (LF = 70) | | Unrelated (LF = 35) | | Unrelated (LF = 46) | | Unrelated (LF = 42) | | Unrelated (LF = 44) | |
| economics | staff | staff | fish | army | rat | forest | buttons | hospital | drama | ship | dog |
| doctor | army | news | zoo | uniform | tie | nurse | football | homework | flute | teacher | flute |
| rugby | ballet | physics | tune | staff | patient | farm | ballet | dentist | subject | drama | injury |
| bed | forest | tiger | teacher | teacher | exam | zoo | injury | reptiles | history | guitar | reptiles |
| rat | school | injury | captain | coat | injury | guard | grammar | exam | birds | rugby | piano |
| dentist | sailor | farm | cat | physics | drama | rugby | clerk | palace | ballet | ambulance | radio |
| football | university | nurse | grammar | flute | violin | captain | hockey | fur | rat | medicine | cat |
| captain | typist | sailor | coat | doctor | lion | typist | tie | library | guard | economics | zoo |
| buttons | cat | exam | football | grammar | guitar | tiger | shirt | clerk | zoo | army | buttons |
| basin | clerk | forest | economics | economics | nurse | drama | staff | typist | soccer | surgery | news |
| waiter | physics | army | English | harp | captain | sailor | news | ship | violin | captain | typist |
| window | cricket | birds | sheep | birds | utensil | post | lion | piano | grammar | instrument | grammar |
| guard | farm | post | flute | fur | tiger | history | guitar | injury | cat | post | doctor |
| shower | injury | ballet | gear | reptiles | cook | tune | flute | radio | coat | mouth | ballet |
| patient | grammar | school | university | hockey | king | economics | dog | king | forest | uniform | harp |
| dog | nature | drama | subject | cricket | cat | doctor | teacher | ambulance | captain | violin | king |
| ambulance | ship | guard | elephant | ballet | suit | reptiles | army | buttons | tiger | tune | trousers |
| sheep | skirt | nature | reptiles | English | forest | uniform | gear | cricket | nature | utensil | gear |
| uniform | study | history | office | piano | guard | nature | cricket | hockey | physics | fish | patient |
| zoo | utensil | fur | cricket | instrument | gear | birds | physics | farm | patient | staff | tiles |

| Farm (LF = 100) | | School (LF = 114) | | Hospital (LF = 72) | | Office (LF = 130) | | Kitchen (LF = 105) | | Builder (LF = 126) | | Police LF = (66) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Strong (121) | Weak (79) | Strong (121) | Weak (106) | Strong (41) | Weak (104) | Strong (151) | Weak (109) | Strong (117) | Weak (93) | Strong (204) | Weak (48) | Strong (72) | Weak (60) |
| yard | truck | children | revise | doctor | matron | work | rank | sink | door | house | block | car | gun |
| stable | stock | uniform | trip | ward | sick | desk | gossip | table | fire | bricks | permission | jail | helmet |
| plough | harvest | desk | meal | injury | death | secretary | record | food | dinner | stone | trade | crime | beat |
| field | timber | teacher | room | accident | ache | staff | department | utensil | stool | trowel | master | station | dogs |
| country | eggs | class | noise | sterile | fracture | file | clerk | saucepan | cabinet | cement | yard | uniform | blue |
| house | food | bell | milk | pain | care | suit | accounts | larder | bottle | contract | dig | crook | patrol |
| cow | mud | bus | cap | wound | bone | stationary | money | oven | sweep | site | plan | criminal | trial |
| tractor | land | exam | tie | illness | baby | typist | trade | bread | store | materials | dump | cop | force |
| dung | gate | homework | period | nurse | X-ray | firm | union | knife | smoke | work | wire | law | emergency |
| dogs | manager | pupils | results | ambulance | bed | hours | profit | mother | warm | saw | metals | inspector | file |
| Unrelated (LF = 79) | | Unrelated (LF = 42) | | Unrelated (LF = 35) | | Unrelated (LF = 30) | | Unrelated (LF = 54) | | Unrelated (LF = 56) | | Unrelated (LF = 50) | |
| beach | ambulance | manufacture | cow | sheep | forest | tractor | birds | beach | coast | beach | eggs | fish | dung |
| sail | firm | reptiles | farm | beach | plough | wound | yard | sheep | football | sail | cow | sick | tiger |
| desk | tutor | nurse | hospital | sail | sailor | crime | ship | sail | ambulance | desk | nurse | yard | maid |
| swim | needle | chimney | police | tractor | lion | waves | shell | tractor | island | swim | anchor | tent | picnic |
| office | army | sail | army | boat | crime | exam | grass | boat | file | gun | sea | shell | beach |
| clerk | guard | captain | court | grass | ocean | cow | anchor | grass | sailor | class | clerk | mud | homework |
| class | hockey | sailor | sale | farm | lessons | blood | hat | jail | forest | waves | elephant | anchor | sale |
| waves | ocean | ambulance | factory | teacher | manufacture | criminal | tent | teacher | desk | maid | matron | hat | holiday |
| boat | lion | tiger | plough | jail | sun | chimney | forest | tent | mud | exam | lessons | ship | camp |
| exam | lessons | waitress | tractor | football | anchor | lion | sail | trade | foam | jail | tutor | forest | dairy |
| surf | teacher | anchor | horse | tiger | saucepan | injury | nurse | anchor | sweep | doctor | picnic | sail | surf |
| cop | illness | sheep | ship | coast | elephant | matron | giraffe | police | lessons | reptiles | student | teacher | student |
| book | yachts | crime | ocean | cow | hockey | saucepan | beach | books | knife | fish | sheep | broom | party |
| bed | waitress | merchant | patient | captain | chimney | sheep | patient | tiger | contract | holiday | court | ocean | milk |
| nurse | typist | waves | swim | waitress | bees | larder | hens | surf | dung | camp | patrol | tractor | waitress |
| staff | matron | blood | boat | surf | mop | swim | ambulance | clerk | figures | surf | illness | cow | island |
| captain | secretary | dung | coast | factory | guard | mop | stable | bed | warm | police | mop | doctor | hens |
| carpet | seaweed | elephant | yachts | sale | trade | foam | ocean | bus | typist | sailor | crime | swim | plank |
| patient | crime | sand | forest | kennel | Clingfilm | bees | hockey | horse | stationary | lion | lettuce | counter | merchant |
| sailor | uniform | surf | beach | waves | sand | cake | camp | lion | gun | book | ambulance | plough | field |

| Beach (LF = 52) | | Clothes Shop (LF = 121) | | Picnic (LF = 70) | | Library (LF = 126) | | Dentist (LF = 31) | | Restaurant (LF = 98) | | Birthday Party (LF = 131) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Strong (59) | Weak (45) | Strong (95) | Weak (144) | Strong (68) | Weak (72) | Strong (156) | Weak (96) | Strong (44) | Weak (17) | Strong (67) | Weak (129) | Strong (193) | Weak (69) |
| sea | birds | store | factory | field | BBQ | books | table | tooth | glasses | food | owner | cake | age |
| boat | hat | counter | return | rug | cake | card | coffee | drill | floss | tip | vegetarian | present | dance |
| seaweed | anchor | town | street | lunch | holiday | novel | service | doctor | tool | menu | chips | card | crisps |
| sun | tree | wardrobe | goods | grass | friends | work | poems | surgery | mould | meal | sauce | games | greetings |
| sand | crowd | rail | wrap | sandwiches | lettuce | information | study | filling | decay | chef | party | candles | shop |
| pebble | chips | money | bag | napkins | rest | reference | magazine | chair | tongue | table | spices | gift | photographs |
| waves | foam | sale | buttons | Clingfilm | wasp | shelf | notes | injection | ache | bill | utensil | food | voucher |
| sail | wind | model | discount | sun | basket | author | literature | gum | medicine | waiter | service | friends | candy |
| swim | holiday | fashion | work | countryside | cook | papers | knowledge | dentures | hygiene | diner | window | money | baby |
| ball | port | changing rooms | assistant | lunchbox | weather | archive | glasses | mouth | saliva | bistro | money | children | cook |
| **Unrelated (LF = 59)** | | **Unrelated (LF = 54)** | | **Unrelated (LF = 56)** | | **Unrelated (LF = 38)** | | **Unrelated (LF = 49)** | | **Unrelated (LF = 35)** | | **Unrelated (LF = 48)** | |
| office | tie | farm | swim | jail | hospital | football | sauce | harp | shirt | hockey | reptiles | exam | lion |
| reptiles | library | hospital | teacher | crime | clerk | farm | injury | typist | grammar | sailor | grammar | grammar | gear |
| class | factory | police | elephant | office | police | tune | mouth | rat | drama | sledge | tune | cricket | birds |
| nurse | plough | beach | waves | gun | army | nurse | gear | tiger | ship | drama | linen | homework | snow |
| teacher | uniform | court | law | sheep | sale | fur | zoo | reptiles | uniform | zoo | typist | football | army |
| chimney | trade | field | typist | typist | factory | dog | ship | tie | rugby | nurse | injury | cat | soccer |
| gun | lion | cow | exam | library | boarding | cavity | cat | hockey | piano | tiger | teacher | teacher | window |
| desk | court | army | surf | uniform | plough | fish | piano | fish | ambulance | economics | fur | bed | dentist |
| file | window | plough | ocean | tiger | tractor | shirt | tie | song | gear | instrument | religion | buttons | ambulance |
| carpet | patient | tractor | mop | exam | homework | birds | guard | flute | tune | buttons | lion | desk | zoo |
| staff | criminal | bed | ship | street | trade | rugby | ambulance | school | coat | farm | captain | basin | hockey |
| cow | matron | nurse | captain | nurse | guard | utensil | trousers | skirt | buttons | tie | reindeer | rat | reptiles |
| door | sheep | hockey | patient | staff | cop | instrument | hockey | guard | nature | cavity | physics | tiger | university |
| army | tractor | tiger | jail | chimney | counter | army | buttons | forest | fur | lawn | cat | sailor | clerk |
| exam | ward | sun | lion | tutor | shelf | sailor | coat | physics | violin | sheep | dog | tiles | injury |
| sweep | economy | tree | injury | illness | buy | soccer | patient | guitar | zoo | surgery | rugby | carpet | coat |
| metals | jail | cop | ambulance | mop | sailor | tiger | captain | university | history | gift | nature | nurse | patient |
| hens | tiger | tutor | forest | anchor | sand | violin | news | soccer | sailor | post | ambulance | doctor | forest |
| clerk | thieves | horse | lorry | lion | ambulance | suit | diner | cat | football | bed | hammer | farm | economics |
| suit | saucepan | bees | matron | duty | blood | sheep | screw | teacher | wood | chamber | clerk | history | weapon |

| Kitchen Items (LF = 15) | | Vehicles (LF = 35) | | Tools (LF = 6) | | Furniture (LF = 39) | | Vegetables (LF = 6) | | Stationary (LF = 10) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Related | | Related | | Related | | Related | | Related | | Related | |
| knife | grater | car | truck | screwdriver | wrench | chair | wardrobe | potato | turnip | paper clip | pencil sharpener |
| fork | ladle | bus | ferry | tape measure | chisel | dining table | stool | carrot | parsnip | rubber | stapler |
| teaspoon | sieve | lorry | yacht | hacksaw | drill | desk | mirror | onion | courgette | pen | scissors |
| saucepan | tongs | bicycle | taxi | Stanley knife | clamp | dresser | sofa | peas | butternut squash | pencil | folder |
| corkscrew | jug | motorcycle | jeep | hammer | torch | cabinet | bench | beans | pepper | post-it notes | label |
| frying pan | spatula | tram | helicopter | trowel | ladder | bookcase | cupboard | celery | cucumber | highlighter | ring binder |
| rolling pin | whisk | tractor | scooter | nails | crowbar | bed | couch | broccoli | lettuce | ruler | notebook |
| bowl | cup | train | coach | screws | chainsaw | drawers | shelves | cauliflower | mushroom | protractor | marker pen |
| jar | plate | van | speedboat | pliers | shears | recliner | coffee table | sweet potato | cabbage | compass | plastic wallet |
| mug | wooden spoon | aeroplane | ship | wire cutters | axe | lamp | armchair | leek | radish | clipboard | drawing pin |
| Unrelated (LF = 26) | | Unrelated (LF = 14) | | Unrelated (LF = 14) | | Unrelated (LF = 25) | | Unrelated (LF = 22) | | Unrelated (LF = 15) | |
| saxophone | notebook | passion fruit | scone | beans | tulip | t-shirt | tangerine | mosquito | screws | raspberry | dress |
| yacht | eyebrow | accordion | lily | lettuce | broccoli | lemonade | aeroplane | trombone | mirror | lager | coffee |
| socks | armadillo | church | scorpion | milkshake | skirt | pigeon | cider | lorry | cymbals | parrot | whale |
| locust | jeans | mango | sofa | library | chicken | jeep | jellyfish | dolphin | cabinet | doughnut | beetle |
| museum | trumpet | daisy | orange juice | melon | celery | lobster | flapjack | vest | torch | rain coat | falcon |
| pliers | crow | monkey | apricot | flea | shark | cherry | zebra | lamb | squid | orchid | bun |
| post office | screwdriver | cardigan | freezer | shrimp | cheesecake | donkey | water | hoover | tiger | canary | courgette |
| jacket | compass | cake | mockingbird | gorilla | sheep | daffodil | town hall | butterfly | wire cutters | sieve | armchair |
| wolf | chapel | oyster | whisk | shirt | leopard | pasty | apple | stapler | bookcase | tram | tuna |
| axe | horse | plate | trousers | muffin | owl | cabbage | scooter | telephone | violin | piano | cockroach |
| owl | ship | beer | pig | primrose | gin | blackcurrant | lilac | rhinoceros | computer | tumble dryer | stingray |
| chainsaw | cello | shelves | marigold | mushroom | café | hawk | cattle | hammer | panda | moth | ginger bread |
| speedboat | chisel | lettuce | clothes shop | eel | bank | helicopter | wasp | mussel | shorts | sunflower | socks |
| cinema | train | hamster | banana | hoodie | carnation | cinema | radish | cd-player | neck | jellyfish | teaspoon |
| camel | crocodile | t-shirt | Meerkat | guinea pig | duck | flute | wine | kingfisher | eagle | trowel | theatre |
| scorpion | police station | croissant | wardrobe | bagel | waffle | pepper | onion | suit | hairdryer | ladle | grapes |
| vulture | leopard | harp | nightclub | brandy | sunflower | bread | tractor | giraffe | bear | haddock | cupcake |
| rain coat | earlobe | bowl | guitar | art gallery | sparrow | shorts | clarinet | taxi | dragonfly | television | reindeer |
| bed | centipede | lion | raspberry | peach | scarf | train station | spider | protractor | lamp | kiwi | poppy |
| motorcycle | suit | microwave | peacock | crumpet | whiskey | elephant | seahorse | cat | rubber | bench | motorcycle |

| Musical instruments (LF = 5) | | Beverages (LF = 52) | | Town centre buildings (LF = 53) | | Fruits (LF = 6) | | Clothing (LF = 23) | | Sea creatures (LF = 4) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Related | | Related | | Related | | Related | | Related | | Related | |
| piano | oboe | water | beer | church | bakery | plum | kiwi | dress | jacket | dolphin | plaice |
| trumpet | saxophone | orange juice | wine | town hall | nightclub | apricot | blackberry | trousers | rain coat | crab | cod |
| flute | recorder | coffee | vodka | bank | library | peach | pear | tights | shorts | seahorse | jellyfish |
| clarinet | accordion | tea | gin | clothes shop | art gallery | raspberry | nectarine | shirt | hoodie | shark | haddock |
| French horn | drum kit | hot chocolate | whiskey | train station | museum | apple | grapes | tie | cardigan | octopus | lobster |
| trombone | harp | coke | cocktail | cinema | post office | mango | blackcurrant | skirt | jeans | squid | mussel |
| bassoon | violin | lemonade | cider | cafe | chapel | strawberry | passion fruit | socks | jumper | eel | shrimp |
| cymbals | cello | milkshake | port | hotel | theatre | tangerine | melon | t-shirt | scarf | seal | oyster |
| cornet | xylophone | apple juice | brandy | shopping mall | police station | banana | cherry | cagoule | blouse | tuna | starfish |
| organ | guitar | lager | sherry | pub | restaurant | orange | pineapple | vest | suit | whale | stingray |
| Unrelated (LF = 10) | | Unrelated (LF = 15) | | Unrelated (LF = 10) | | Unrelated (LF = 12) | | Unrelated (LF = 21) | | Unrelated (LF = 26) | |
| ferry | chimpanzee | paper clip | microwave | spatula | tractor | trousers | iris | cow | highlighter | nightclub | art gallery |
| orange | sweet pea | recliner | moth | lily | tea | grasshopper | squid | trumpet | nails | desk | rose |
| jar | seal | van | hoodie | rain coat | shears | spatula | sparrow | orange juice | van | cider | mosquito |
| cheetah | cricket | plate | clipboard | chisel | tomato | stool | leopard | chimpanzee | bluebell | hotel | robin |
| couch | oven | plaice | drill | turnip | cider | bassoon | Stanley knife | sieve | telephone | carnation | gorilla |
| hacksaw | dresser | skirt | tractor | helicopter | shirt | pub | ladybird | parsnip | beetle | jumper | radio |
| bowl | vodka | pie | French horn | dolphin | mosquito | hot chocolate | shoulder | restaurant | vulture | pasty | cheesecake |
| brownie | dishwasher | ant | cauliflower | centipede | passion fruit | cheetah | parrot | raspberry | sunflower | blackberry | drawing pin |
| quail | squid | drawers | lobster | hoover | mussel | aeroplane | louse | waffle | coffee table | whiskey | library |
| caterpillar | kettle | crowbar | iron | meerkat | vulture | yacht | cardigan | tuna | organ | pepper | strawberry |
| lavender | thistle | xylophone | bagel | sparrow | ladle | seahorse | spatula | chainsaw | banana | cupboard | plate |
| shrimp | goose | tape measure | hippopotamus | dining table | recliner | hawk | cornet | ring binder | flapjack | coach | bus |
| jumper | jeans | crab | tie | tangerine | wardrobe | chicken | axe | tram | bear | theatre | socks |
| rolling pin | shopping mall | chapel | screwdriver | ship | sherry | toaster | shark | folder | cheek | cherry | oven |
| post office | pencil | shortbread | cupcake | crab | socks | drum kit | woodpecker | apricot | goat | kettle | ginger bread |
| strawberry | starfish | forget-me-not | grater | peas | violets | museum | mussel | cheesecake | scorpion | hamster | crowbar |
| cookie | Swiss roll | bee | lamp | calf | stingray | cup | stereo | marigold | violets | forehead | carrot |
| marker pen | knee | leg | duck | waffle | notebook | bicycle | accordion | lion | oyster | dragonfly | trombone |
| leek | scissors | starfish | raven | blouse | peach | hacksaw | screws | tooth | tongs | rubber | coke |
| ladder | cagoule | hummingbird | tulip | frying pan | pliers | dragonfly | rain coat | scooter | car | clarinet | wasp |

| Flowers (LF = 9) | | Creepy crawlies (LF = 4) | | Foreign/Zoo animals (LF = 9) | | Birds (LF = 3.8) | | Body parts (LF = 39) | |
|---|---|---|---|---|---|---|---|---|---|
| Related | | Related | | Related | | Related | | Related | |
| lily | lavender | ladybird | moth | bear | gorilla | pigeon | woodpecker | ankle | mouth |
| thistle | lilac | spider | flea | lion | meerkat | owl | kingfisher | chest | lip |
| carnation | marigold | bee | dragonfly | wolf | panda | eagle | peacock | cheek | tooth |
| rose | orchid | mosquito | caterpillar | elephant | reindeer | sparrow | hawk | elbow | earlobe |
| daffodil | sunflower | ant | centipede | giraffe | leopard | crow | canary | fingers | forehead |
| bluebell | poppy | wasp | cricket | rhinoceros | chimpanzee | parrot | quail | wrist | neck |
| primrose | sweet pea | beetle | scorpion | hippopotamus | crocodile | robin | hummingbird | knee | shoulder |
| forget-me-not | daisy | grasshopper | cockroach | tiger | armadillo | vulture | falcon | jaw | toes |
| iris | tulip | butterfly | louse | fox | monkey | dove | raven | leg | chin |
| hyacinth | violets | fruit fly | locust | zebra | cheetah | blackbird | mockingbird | arm | eyebrow |
| Unrelated (LF = 16) | | Unrelated (LF = 29) | | Unrelated (LF = 17) | | Unrelated (LF = 22) | | Unrelated (LF = 26) | |
| pig | Swiss roll | clarinet | coach | hacksaw | jumper | coffee | pasty | kiwi | pineapple |
| bookcase | lion | lemonade | jug | pencil | scooter | cinema | restaurant | knife | cabbage |
| ruler | truck | hotel | spatula | grater | cello | mango | cherry | milkshake | chainsaw |
| coffee | couch | apple | cat | blackberry | bank | drawers | hoover | giraffe | coach |
| cookie | label | cabinet | croissant | harp | blender | chisel | bagel | brownie | tea |
| elbow | vodka | broccoli | gorilla | clamp | speedboat | tongs | corkscrew | cabinet | café |
| fox | desk | scissors | blender | hoodie | rain coat | tie | bakery | plum | orange |
| shrimp | library | recorder | cocktail | computer | lettuce | dog | piano | wrench | bluebell |
| hoodie | wolf | cider | teaspoon | bagel | radish | muffin | pub | jeep | dove |
| drum kit | jacket | cup | van | lily | theatre | radio | oven | hotel | fruit fly |
| chainsaw | waffle | knee | lettuce | compass | lilac | sofa | pie | flea | dress |
| spatula | leopard | t-shirt | cymbals | wine | ferry | taxi | telephone | stapler | truck |
| train station | hammer | parrot | pear | marker pen | accordion | plate | shortbread | donkey | stool |
| goat | armchair | cow | bed | chapel | armchair | hairdryer | screws | flapjack | violin |
| leg | helicopter | toaster | dove | passion fruit | cupcake | guitar | ship | panda | bank |
| dove | brandy | crumpet | tooth | cider | lavender | spider | train | chapel | radio |
| moth | jellyfish | cucumber | television | whisk | xylophone | beetle | wardrobe | library | parrot |
| cod | cockroach | shears | sweet pea | muffin | melon | seal | ring binder | iris | daisy |
| shorts | calf | leek | scarf | heater | bowl | cardigan | whiskey | eagle | haddock |
| kettle | toes | gin | arm | orchid | pepper | wrench | waffle | scone | beetle |

| Domestic animals (LF = 24) | | Home appliances (LF = 32) | | Bakery products (LF = 10) | |
|---|---|---|---|---|---|
| Related | | Related | | Related | |
| cat | guinea pig | blender | television | muffin | crumpet |
| dog | duck | toaster | refrigerator | cookie | doughnut |
| horse | goose | hoover | oven | brownie | Swiss roll |
| cow | parrot | heater | microwave | croissant | pie |
| goat | hamster | washing machine | stereo | scone | ginger bread |
| pig | turkey | kettle | telephone | pasty | waffle |
| chicken | calf | hairdryer | iron | bread | flapjack |
| donkey | sheep | computer | radio | bagel | cheesecake |
| camel | cattle | dishwasher | freezer | bun | cupcake |
| rabbit | lamb | tumble dryer | cd-player | cake | shortbread |
| Unrelated (LF = 21) | | Unrelated (LF = 11) | | Unrelated (LF = 10) | |
| dining table | parsnip | potato | aeroplane | screwdriver | trowel |
| onion | lemonade | trousers | rose | crab | meerkat |
| town hall | strawberry | wolf | crumpet | beetle | peacock |
| primrose | bread | cocktail | mushroom | giraffe | violin |
| pie | microwave | carrot | starfish | guitar | wardrobe |
| jeans | ship | centipede | locust | yacht | leopard |
| blackberry | suit | kingfisher | cupcake | crow | eagle |
| recliner | daffodil | shark | vodka | rhinoceros | ankle |
| beans | refrigerator | goat | rain coat | jellyfish | lorry |
| whiskey | oboe | bun | carnation | woodpecker | fox |
| shears | cabbage | sherry | canary | crocodile | tumble dryer |
| jar | jeep | pineapple | duck | blouse | chimpanzee |
| telephone | bowl | harp | caterpillar | scooter | falcon |
| broccoli | nectarine | squid | tiger | camel | rubber |
| cornet | shortbread | hoodie | suit | jacket | compass |
| beer | wrench | sunflower | courgette | bank | saxophone |
| chair | motorcycle | sparrow | pear | paper clip | cinema |
| ferry | bench | lobster | ginger bread | guinea pig | centipede |
| muffin | brownie | bagel | reindeer | whale | armadillo |
| computer | freezer | turnip | oyster | scarf | scorpion |

| Flat (LF = 32) | | Strong-smelling (LF = 41) | | Green (LF = 10) | | Brown (LF = 18) | | Heavy (LF = 52) | | Black (LF = 10) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Related | | Related | | Related | | Related | | Related | | Related | |
| plate | key | detergent | skunk | emerald | guacamole | acorn | pine cone | gravestone | statue | peppercorns | spider |
| magazine | paper | soap | garlic | broccoli | lettuce | gravy | bread | bowling ball | tyre | record | liquorice |
| pancakes | blackboard | nail polish | sewage | jade | spinach | cork | whisky | computer | bed | coal | mascara |
| coins | CD | landfill | sweat | frog | moss | walnut | cocoa | elephant | piano | leather jacket | soot |
| towel | comb | socks | sulphur | cactus | grass hopper | bear | cigar | truck | tumble dryer | ravens | crow |
| TV | mirror | lemons | garbage | runner beans | peas | potato | pretzel | anchor | wardrobe | tar | prunes |
| iron | laptop | cheese | petrol | kiwi | garden string | bagel | conkers | car | log | gorilla | panther |
| spatula | rug | sour milk | onions | grass | lime | coconuts | cello | dumbbells | vending machine | ebony | treacle |
| biscuit | tiles | bread | feet | ivy | pistachio | wood | cardboard | couch | luggage | bat | tyres |
| coaster | postcard | cigarettes | fish | Christmas tree | caterpillar | cinnamon | chocolate | television | mattress | blackboard | sunglasses |
| Unrelated (LF = 31) | | Unrelated (LF = 24) | | Unrelated (LF = 23) | | Unrelated (LF = 24) | | Unrelated (LF = 22) | | Unrelated (LF = 17) | |
| palm tree | elves | napkins | wall | ginger | ravens | cd | apple | pillow | lighter | jade | peas |
| eggs | aeroplane | clarinet | saucer | caramel | mustard | emerald | cherry | biscuit | ruler | butter | milk |
| shower block | strawberry | statue | kettle | bone | London bus | mango | wedding dress | cling film | towel | apple | sea gull |
| hose | blender | wrench | brush | horse | marshmallows | roses | candy floss | cushion | whistle | broccoli | moss |
| onion | waves | poster | blanket | cranberries | snow | water | zebra | paper | tin foil | egg | lettuce |
| dumbbell | cucumber | glass | map | ebony | sheep | clouds | lettuce | pencil | trainers | coriander | olive oil |
| paint | nuts | handbag | desk | cherry | stop sign | mayonnaise | postman's van | needle | mug | ivy | rice |
| conditioner | apple | pillow | butterfly | butter | lobster | glass | nectarine | lollipop | wafer | runner beans | meringue |
| bird cage | bridge | ladder | mattress | coffee | raspberries | whipped cream | London bus | balloon | wire | bone | marshmallows |
| milkshake | tree | necklace | scissors | lipstick | meringue | Santa | tongue | stamp | crepe | caramel | pistachio |
| plant | sweet jar | scales | bicycle | eggs | post-box | needle | whale | grass | t-shirt | foam | mango |
| car | moon | guitar | watch | bat | milk | milk | tomato | silk | salad | blood | lawn |
| earth | bulb | pen | tissue box | crows | record | checkered flag | peas | plate | tray | emerald | pineapple |
| panda | cow | tray | CD | coal | mascara | carrots | lime | feather | ticket | chalk | kiwi |
| basin | open fire | spatula | camera | flour | chips | polar bears | soccer ball | gas | key | flour | salt |
| wasp | bucket | chair | umbrella | rodent | sea gull | leprechaun | oranges | shorts | sheets | cheese | lime |
| tulip | sun | lipstick | envelope | foam | salt | grapes | sweetcorn | thread | bowl | chef hat | oranges |
| glue | bees | tap | photograph | blood | ruby | bone | panda | postcard | debit card | cherry | mustard |
| sofa | glass | nuts | flour | blackboard | panda | shamrock | penguin | bread | skewer | frog | polar bear |
| cone | ear phones | pencil | trophy | chocolate | cow | radiator | snow | butterfly | umbrella | grass | candy floss |

| Rough (LF = 13) | | Hot (LF = 24) | | Runny (LF = 62) | | Sticky (LF = 9) | | Cold (LF = 12) | | Soft (LF = 22) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Related | | Related | | Related | | Related | | Related | | Related | |
| Christmas tree | crocodile | porridge | oven | milk | custard | cello tape | mango | beer | air conditioner | flowers | tie |
| door mat | wood chippings | stove | fireplace | sweat | shampoo | glue | cement | glaciers | Antarctica | marshmallows | sandwiches |
| rose bush | charcoal | radiator | iron | water | honey | dough | lollipops | freezer | grapes | mattress | feather |
| sandpaper | tyre | lava | toaster | coffee | petrol | caramel | paste | polar bears | popsicle | scarf | grass |
| tree bark | sand | sun | hair straightener | wine | glue | honey | syrup | ice cream | yogurt | dough | slippers |
| hay | mesh | chilli pepper | coals | blood | olive oil | jelly | sweets | snow | skating rink | robe | rug |
| brush | rope | candle | BBQ | gravy | milkshake | spiders web | treacle | salad | sleet | scone | towel |
| gravel | potpourri | kettle | furnace | paint | perfume | candy floss | paint | Pluto | snowman | cushion | linen |
| bricks | coconut | engine | heater | tea | ketchup | duct tape | slug | icicles | fridge | bread | blanket |
| basket | beard | light bulbs | Jacuzzi | beer | treacle | stamps | blue tack | igloo | milkshake | cake | hamsters |
| Unrelated (LF = 23) | | Unrelated (LF = 11) | | Unrelated (LF = 30) | | Unrelated (LF = 37) | | Unrelated (LF = 39) | | Unrelated (LF = 29) | |
| Clingfilm | piano | pudding | banana | guitar | poles | briefcase | horse | computer | chef hat | wall | boat |
| beer | milkshake | apple | cucumber | photographs | wasp | cash machine | hair brush | stamp | coal | Frisbee | desk |
| coffee | shampoo | mattress | ice cream | sunglasses | peanuts | box | guitar | car | bone | cage | chimney |
| glue | silk | post-box | salt | bill | diary | aeroplane | mattress | paper | cigarette | barrel | pegs |
| cushion | linen | flower pot | pencil | walkie talkie | mannequin | bench | mug | wedding dress | feather | statue | tablets |
| grass | milk | yogurt | holly | brick | record | bicycle | ladder | light bulbs | sunglasses | trophy | scissors |
| blood | mattress | magazine | cupcake | box | bottle | basket | magazine | ball | steam | lorry | fossils |
| cd | olive oil | feather | cherry | Clingfilm | wheel | book | laptop | iron | olive oil | rake | fridge |
| feather | scarf | snowman | pineapple | napkins | skipping rope | airbag | fridge | Jacuzzi | tin foil | bicycle | coins |
| bread | petals | shopping trolley | refrigerator | glass window | stone | camera | kettle | engine | plug | tray | computer |
| aubergine | perfume | sugar | petals | scissors | rug | car | petals | rug | kettle | flower pot | dumbbell |
| hamsters | petrol | bicycle | body lotion | timber | wrench | boots | feather | bees | mascara | lectern | chairs |
| honey | paint | acorn | Clingfilm | rake | drums | caravan | Antarctica | toaster | butterfly | blackboard | building |
| custard | mirror | leaf | rake | television | novel | cloth | napkins | saucepan | television | bone | shell |
| dough | scone | chalk | scissors | bunting | hanger | bus | lettuce | books | lava | wrench | van |
| cake | sandwiches | beer | violin | piano | wood chippings | chair | curtains | firewood | umbrella | injection | bricks |
| flowers | photographs | microphone | rubber | saucepan | stick | bottle | computer | coffee | hair brush | tap | fence |
| postcard | robe | nectarine | apron | door | cracker | blender | frame | chalk | hairdryer | bucket | ladder |
| ketchup | marshmallows | juice | brush | light bulb | laptop | carpet | necklace | eggs | photographs | bowl | television |
| gravy | rug | coins | banana | manuscripts | hair net | bridge | coins | sun | tongue | stairs | train |

| Shiny (LF = 41) | | Smooth (LF = 22) | | Slippery (LF = 26) | | Black & White (LF = 15) | | Noisy (LF = 16) | | Round (LF = 25) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Related | | Related | | Related | | Related | | Related | | Related | |
| saxophone | lighter | glass | petals | detergent | satin | chequered flag | Oreo | horn | gong | satellite dish | peas |
| spanner | mirror | computer screen | spoons | gel | oil | killer whale | newspaper | vacuum cleaner | dogs | tyre | cookie |
| cufflinks | kitchen foil | diamond | grapes | noodles | silk | panda | dominos | fireworks | microphone | apple | plate |
| gold ring | eyes | hummus | body lotion | icicle | ice cubes | football | pirate flag | snoring | babies | clock | doughnut |
| sink | motorbike | postcard | ice rink | rink | butter | penguin | Dalmatian | aeroplane | drums | marbles | coin |
| nail clippers | sunglasses | key | leaf | frog | lotion | crosswords | skunk | guns | stereo | ladybird | Frisbee |
| coins | sequins | cream cheese | aubergine | slug | soap | cow | referee shirt | alarms | lawnmowers | globe | ring |
| puddle | spoon | feather | apple | snake | fish | Guinness | zebra | racing car | thunder | wheel | button |
| fire | bulb | pebble | silk | bath tub | banana peel | piano | dice | speakers | whistle | eye | football |
| chandelier | keys | coins | CD | bouncy castle | grease | checkerboard | barcode | washing machine | lion | CD | saucer |
| Unrelated (LF = 28) | | Unrelated (LF = 12) | | Unrelated (LF = 20) | | Unrelated (LF = 27) | | Unrelated (LF = 24) | | Unrelated (LF = 23) | |
| daisy | timber | sandpaper | fibre sponge | clippers | brush | grass | apple | ketchup | cheese | stable | lock |
| newspaper | peanuts | porcupine | wood chippings | fibre sponge | basket | Santa | petals | lipstick | needle | toothbrush | cleaver |
| letter | towel | alligator | potpourri | barbed wire | tablets | honey | cherry | binoculars | books | speakers | boat |
| eye shadow | tea bag | razor | rose bush | gloves | butterfly | coins | peanuts | giraffe | plug | stairs | knife |
| horse | crow | hair rollers | clippers | fossils | pillow | mirror | wasp | napkins | rope | sofa | display board |
| curtains | paper | Frisbee | ginger | sandpaper | cactus | peas | tree | salt | blanket | socks | gloves |
| forest | pillow | net | fence | armadillo | roof tiles | kiwi | sandwiches | daffodil | cherry | tissue box | carrier bags |
| manuscripts | weeds | doormat | Velcro | Velcro | desk | foam | gas | towel | soap | pew | bus |
| blanket | shorts | grater | hay | hair brush | building | tomato | tongue | spoon | spinach | towel | cheque |
| blueberries | receipt | mesh | bricks | napkins | crocodile | wine | wood chippings | apron | pudding | post-box | books |
| monkey | panda | sand | coconut | bread | paper | lava | sun | pencil | bed | oven | label |
| flour | tiger | pine cone | tree bark | cow | ring | Clingfilm | lion | raspberries | thread | tongs | bread |
| cow | tablets | scratching post | building | shorts | biscuit | globe | forest | windows | teabag | shorts | dogs |
| elephant | smoke | toast | Christmas tree | wood chippings | hairdryer | lipstick | lager | grass | gloves | wallet | camera |
| coffee beans | soil | barbed wire | crocodile | cupcake | tooth | custard | weeds | rubber | mug | wardrobe | hutch |
| mattress | throws | dry skin | hedgehog | sugar cubes | bone | tangerine | shark | ice cream | postcard | podium | computer |
| cloth | socks | roof tiles | rocks | sea gull | skewer | lettuce | leprechaun | petals | pie | rucksack | grass |
| bread | sheets | armadillo | cactus | mesh | toaster | cigarette | mango | caramel | onion | seatbelt | comb |
| lion | sand | rope | beard | rust | microphone | ladybird | blood | mustard | bowl | ticket | apron |
| blusher | sandwiches | firewood | brush | ice cubes | bricks | teeth | chips | flour | charcoal | lighter | robe |

| Square/Rectangle (LF = 69) | | Red (LF = 20) | | Hard (LF = 47) | | White (LF = 36) | |
|---|---|---|---|---|---|---|---|
| Related | | Related | | Related | | Related | |
| postcard | toaster | roses | tongue | clothes pegs | statue | snow | tooth |
| envelope | ice cubes | ketchup | strawberries | barrel | shell | salt | sea gull |
| books | blackboard | cherry | blood | nails | fossils | chalk | swan |
| door | mattress | phone box | lipstick | stone | pebble | meringue | rice |
| stamp | shopping trolley | ruby | Santa | saucepan | door | flour | bone |
| bed | placemat | holly | tomato | helmet | hammer | sugar | lard |
| dice | television | Ferrari | London bus | plank | chopping board | chef hat | wedding dress |
| passport | laptop | postman's van | post-box | tooth | table | paper | milk |
| chopping board | tissue box | stop sign | poppy | brick | sculpture | marshmallows | envelope |
| brick | briefcase | lobster | fire engine | blackboard | bone | foam | sheep |
| Unrelated (LF = 11) | | Unrelated (LF = 27) | | Unrelated (LF = 23) | | Unrelated (LF = 34) | |
| shark | macaroni | trolley | coffee | sofa | fuel | crisps | wasp |
| ice cream cone | stocking | sugar | gold | shampoo | linen | bees | post box |
| ramekin | tyre | mosquitoes | ladder | socks | chef hat | blood | sun |
| doughnut | sausage | spider web | lion | paint | gloves | chips | lion |
| exercise ball | blueberries | wire | sea gull | oil | baking paper | fire | wooden stick |
| barrel | tie | silver foil | cockroach | syrup | cloth | gold | holly |
| scissors | wheel | rake | mirror | pillows | beer | bricks | ketchup |
| bone | wellies | pool | moon | shorts | flowers | cherry | timber |
| skipping rope | roses | stable | bread | towel | cake | biscuit | tongue |
| horse | cello tape | receipt | Clingfilm | napkins | doughnut | blackboard | lifeguard |
| pebbles | vegetables | spanner | milk | sauce | cupcake | firewood | tree |
| lettuce | tinsel | tongs | lettuce | scone | flour | forest | pepper |
| screws | globe | wasp | cement | milk | exercise ball | barrel | tractor |
| crab | hazelnuts | sea | crisps | sandwiches | curtain | coffee | seatbelt |
| saucepan | umbrella | snow | fossils | pudding | carpet | bonfire | oil |
| holly | bubbles | panda | charcoal | rug | chips | grass | sea |
| slippers | trowel | pond | chips | tinsel | apron | dung | wood chippings |
| chandelier | star | piano | ice cubes | tea | ice cream | broom | mosquitoes |
| cow | tomato | peas | bone | tongue | butterfly | cockroach | woodlouse |
| peas | candy floss | grass | weeds | mattress | tie | charcoal | weeds |

## APPENDIX D: Experiment 4 – Across modalities *(mean lexical frequency (LF) = 57.7, SD = 112)*

| Airport (LF = 49) | | Café (LF = 31) | | Clothes shop (LF = 108) | | Football match (LF = 31) | | Hospital (LF = 68) | | Hotel (LF = 62) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Strong (33) | Weak (65) | Strong (31) | Weak (31) | Strong (82) | Weak (134) | Strong (36) | Weak (25) | Strong (62) | Weak (73) | Strong (99) | Weak (26) |
| terminal | lift | scone | sofa | money | return | player | t-shirt | illness | care | holiday | toothbrush |
| passport | stairs | coffee | syrup | bag | discount | team | advertisement | doctor | fracture | double bed | cafe |
| flight | restaurant | tea | candle | store | factory | stadium | water bottle | bed | isolation | room service | lounge |
| customs | belt | coffee maker | receipt | model | town | goal post | alcohol | ambulance | death | reception | trolley |
| suitcase | officer | spoon | meeting | assistant | rail | yellow card | lights | X-ray | sick | luggage | window |
| check-in | hall | cake | display counter | sale | goods | scarf | gloves | patient | mask | room | Jacuzzi |
| aeroplane | alcohol | snack | apron | mannequin | work | score board | boots | sterile | baby | receptionist | shampoo |
| runway | perfume | menu | card machine | mirror | counter | referee | pub | accident | matron | tourist | curtains |
| security | control | waiter | tip | fashion | wardrobe | ball | refreshments | ward | crèche | En-suite | kettle |
| luggage | notice board | biscuit | wallet | changing rooms | buttons | pitch | stairs | injury | bone | bed | sofa |
| Unrelated (LF = 27) | | Unrelated (LF = 42) | | Unrelated (LF = 42) | | Unrelated (LF = 34) | | Unrelated (LF = 62) | | Unrelated (LF = 23) | |
| trophy | slippers | chamber | tape measure | weeds | sink | wall paper | caravan | postcard | house | sale | tongue |
| sweep | director | cemetery | stopwatch | saucepan | lettuce | curtains | briefcase | ham | ship | bees | patrol |
| teacher | homework | bone | tractor | envelope | pillow | coffee | fashion | trainers | bouncer | Frisbee | track |
| field | red card | carpet | oxygen mask | coach | tank | hair net | salt | manuscripts | baking paper | leaflet | eggs |
| cake | collars | bed | referee | clippers | tablets | ocean | rock pool | mud | chimney | chalk | officer |
| saucepan | club | hens | exhibits | tray | pier | throws | litter tray | grass | beer | glass screen | display board |
| candles | tip | cage | nurse | beach | card | smoke | diary | sand | hymn | perfume | chopping board |
| vegetarian | tyre pump | wardrobe | model | motorway | milk jug | dinner | carrier | pulpit | beach | basket | VIP box |
| fan | sermon | research | blockage | fish | skipping rope | basket | student | diesel | advertisement | warehouse | seatbelt |
| chef | steak | December | den | food | bin | blanket | engineer | palm tree | bonfire | customs | ear protection |

| Living room (LF = 85) | | Petrol station (LF = 215) | | Railway station (LF = 38) | | Shed (LF = 20) | | Bathroom (LF = 66) | | Chocolate factory (LF = 20) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Strong (105) | Weak (66) | Strong (119) | Weak (310) | Strong (27) | Weak (49) | Strong (27) | Weak (14) | Strong (75) | Weak (58) | Strong (28) | Weak (11) |
| carpet | brick | fuel | bin | track | policemen | screws | cupboard | toilet | cloth | consumer | pipe |
| ceiling | remote | petrol pump | chocolate | train | newspaper | padlock | firewood | tap | rack | machine | chemicals |
| armchair | hearth | motorway | can | ticket | bench | paint tin | clippers | shower | door | hair net | overalls |
| cushion | bookcase | cars | fire | display board | shop | garden | BBQ | water | bedroom | plastic mould | gloves |
| curtains | cottage | tanker | toilet | conductor | yellow line | toolbox | woodlouse | bath | brush | wrapper | canteen |
| lamp | door | diesel | pricelist | briefcase | holiday | lawnmower | chairs | basin | cologne | worker | lorry |
| house | extension | shop | magazine | steam | bag | spade | bulb | towel | scales | manufacture | fridge |
| sofa | magazine | money | flowers | luggage | stairs | ladder | spider web | sink | apartment | conveyor belt | wage |
| television | fire | cash machine | coffee shop | clock | automatic doors | tools | bucket | tiles | pipes | box | warehouse |
| family | telephone | tyre pump | loyalty card | waiting room | engineer | hose | drawer | soap | plumber | shop | building |
| Unrelated (LF = 46) | | Unrelated (LF = 67) | | Unrelated (LF = 58) | | Unrelated (LF = 96) | | Unrelated (LF = 52) | | Unrelated (LF = 35) | |
| trip | nurse | ship | flip-flops | hanger | membership card | pub | sun | stationary | microphone | aeroplane | tie |
| coffee shop | trowel | cruise | organ | cloth | waves | ambulance | food | debit card | cross | book | fracture |
| manager | car | groceries | jail | mould | grill | gossip | blood | bell | remote | injection | dentures |
| hose | flip-flops | sand | camp | mixer | table | chef | literature | photographs | safety goggles | stadium | traffic |
| swimmer | classroom | armchair | woodlouse | plastic mould | bible | Clingfilm | sofa | meal | torch | resort | maid |
| statue | drivers licence | cement | apron | sand | cleaning equipment | post-box | money | guitar | flag | conductor | elephant |
| yellow card | holiday | stairs | bench | music | scratching post | goalkeeper | barmaid | bread | cookie | runway | houses |
| cheque | padlock | tiger | house | sail | bed | milk | class | menu | wage | swimsuit | cement |
| Shower | sick | student | baby | menu | pen knife | van | card | saw | gum | straightener | sweat |
| hairdryer | lighter | flour | panda | mop | stage | archive | oxygen mask | shop | chips | bell | drums |

| Driving (LF = 65) | | Hairdressers (LF = 55) | | Birthday party (LF = 141) | | Lecture hall (LF = 47) | | Pet shop (LF = 41) | | Police (LF = 61) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Strong (32) | Weak (98) | Strong (37) | Weak (72) | Strong (77) | Weak (205) | Strong (52) | Weak (43) | Strong (61) | Weak (20) | Strong (68) | Weak (55) |
| motorway | light | curler | money | games | crisps | projector | table | birds | bell | jail | hat |
| indicator | tank | salon | shower head | Food | Cook | student | row | cage | collars | criminal | dogs |
| wheel | wash | comb | mop | Friends | Money | screen | file | bowl | tablets | car | court |
| driver | radio | shampoo | radio | candles | Voucher | pen | water bottle | cat | treats | helmet | statistics |
| gear | air conditioning | straightener | wedding | Photographs | Baby | lecturer | speakers | hutch | toys | emergency | defence |
| license | go-cart | hair | spray | balloon | dance | information | pointer | fish | brush | constable | file |
| pedal | window | mirror | stool | Card | children | handouts | podium | hamsters | nuts | uniform | desk |
| traffic | bridge | scissors | tea | Cake | suit | blackboard | laptop | wood chippings | leads | patrol | lights |
| brakes | clamp | hairdryer | silver foil | Present | Candy | books | computer | food | shampoo | crime | duty |
| fuel | crossing | brush | magazine | hat | roast | exam | doodle | aquarium | litter tray | station | collar |
| Unrelated (LF = 45) | | Unrelated (LF = 54) | | Unrelated (LF = 82) | | Unrelated (LF = 53) | | Unrelated (LF = 53) | | Unrelated (LF = 57) | |
| dairy | island | wristband | beat | preview | toothbrush | bills | roll | law | chairs | oil | BBQ |
| birds | spray | drill | eggs | path | water bottle | wash | scales | open fire | cash machine | row | curtains |
| dinner | piano | crab | baptism | trolley | rake | goods | wallpaper | glasses | captain | stairs | cattle |
| stairs | manager | ball | water bottle | razor | Shop | ticket | whistle | archaeology | throws | remote control | cat |
| wasp | table | gate | fossils | luggage | sink | money | cutter | pillar | truck | field | Candy |
| oyster | cake | projector | fete | Umbrella | Religion | soap | hut | phone | holiday | lunch | seaweed |
| union | homework | aircraft | mosquitos | octopus | Clock | loin | oven | timetable | painting | poster | Author |
| canteen | hat | hearth | party | Fence | work | countryside | bus | Christmas cards | trees | pain | art |
| label | plan | sandwiches | cupcake | vending machine | toilet | island | sand | Jacuzzi | ice cubes | porter | milk |
| aquarium | charcoal | garden | water fountain | period | window | tracks | dog | pipes | weight | snow | steam |

| The sea (LF = 38) | | Zoo (LF = 90) | | Supermarket (LF = 97) | | Restaurant (LF = 92) | | Foreign Holiday (LF = 51) | | Museum (LF = 45) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Strong (48) | Weak (28) | Strong (110) | Weak (71) | Strong (60) | Weak (134) | Strong (80) | Weak (103) | Strong (47) | Weak (39) | Strong (37) | Weak (53) |
| holiday | camera | giraffe | leaflet | trolley | container | meal | utensil | Hotel | cockroach | archaeology | ticket |
| lifeguard | island | elephant | playground | food | counter | waiter | chips | cruise | flag | statue | research |
| coast | rock pool | keeper | turn style | shelf | mother | menu | cloth | passport | First aid kit | exhibits | animals |
| surfboard | treasure | children | map | basket | carrier | food | money | beach | ski | fossils | pamphlet |
| ocean | salt | monkey | school | car park | handbag | chef | carpet | suitcase | Life jacket | sculpture | map |
| waves | towel | panda | field | goods | flowers | tip | vegetarian | photos | mosquitos | painting | extinct |
| shore | pier | tiger | uniform | cash | family | bill | spices | camera | museum | exhibition | archive |
| beach | octopus | cage | den | bargains | bag | bistro | suit | sun | postcard | guide | shop |
| swimsuit | lighthouse | tourist | camera | shop | money | table | party | abroad | book | gallery | security guard |
| fish | port | souvenirs | glass window | store | warehouse | diner | window | sunglasses | snow | art | students |
| Unrelated (LF = 53) | | Unrelated (LF = 29) | | Unrelated (LF = 33) | | Unrelated (LF = 27) | | Unrelated (LF = 58) | | Unrelated (LF = 84) | |
| doctor | sachets | plumber | indicator | tinsel | dancer | gallery | muscles | chair | utensil | bell | ladder |
| treadmill | belt | pebble | pulpit | choir | sick | wound | Decay | sausages | knowledge | runway | country |
| comb | slicer | hotel | cake | souvenir | pupils | Novel | stamp | sofa | death | pudding | manger |
| money | carriage | altar | cabinet | holiday | illness | newspaper | Lawn | helmet | cracker | food | jukebox |
| fashion | recipe | kitchen | hearth | sailor | suitcase | military | shampoo | Spider web | stool | meal | sand |
| sauce | dung | bicycle | holly | gate | vault | tractor | mud | class | mistletoe | festival | speaker |
| cigarette | glow stick | Clingfilm | chair | cross-trainer | friends | aisle | Medicine | revise | scone | gun | screen |
| knife | postman | laptop | dumbbell | sofa | forest | stable | clamp | Silver foil | instructor | countryside | pebble |
| receipt | prayer | candles | cigarette | cement | passport | ache | valve | laptop | Football match | towel | tree |
| clock | darts | exam | bible | hike | apartment | nurse | trimmer | party | dumbbell | clerk | hose |

| Kitchen (LF = 121) | | Bank (LF = 68) | | Gym (LF = 39) | | Dentist (LF = 27) | | Camping (LF = 42) | | Bakery (LF = 37) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Strong (85) | Weak (157) | Strong (78) | Weak (59) | Strong (31) | Weak (48) | Strong (25) | Weak (30) | Strong (47) | Weak (36) | Strong (25) | Weak (49) |
| bread | slice | queue | gold | treadmill | t-shirt | mouth | ache | fire | repellent | cookie | mixer |
| oven | party | cheque | card | personal trainer | television | surgery | chair | sleeping bag | marshmallows | baker | knife |
| larder | parlour | safe | branch | cross-trainer | Pilates | filling | saliva | grass | Frisbee | pastry | coffee |
| stool | door | statement | glass screen | weight | shorts | dentures | tongue | trees | pegs | roll | recipe |
| dinner | smoke | money | notes | workout | fan | tooth | decay | tent | rope | bun | spices |
| maid | waiter | manager | vault | exercise mat | music | injection | medicine | caravan | pen knife | bread | tongs |
| sink | farm | counter | robbery | trainers | ear phones | gum | mould | torch | shower block | oven | menu |
| food | mother | coins | office | sweat | mirror | floss | glasses | rucksack | cool box | pie | staff |
| table | bottle | balance | pen | sport | sauna | hygiene | tool | hike | lighter | cake | tray |
| cabinet | sweep | ATM | clerk | muscles | socks | drill | doctor | forest | friends | dough | chef hat |
| Unrelated (LF = 40) | | Unrelated (LF = 64) | | Unrelated (LF = 27) | | Unrelated (LF = 36) | | Unrelated (LF = 56) | | Unrelated (67) | |
| branch | life jacket | camera | garden | restaurant | butterfly | carving | yard | spotlight | bulb | treasure | airbag |
| car | policemen | dogs | chocolate | timeline | hutch | leads | passenger | hair | sweep | ATM | t-shirt |
| doodle | sprinklers | wrap | yard | station | peas | footpath | holiday | stationary | counter | wire | bell |
| computer | locker | concert | bible | post-box | bowl | discount | security guard | return | factory | scenery | party |
| stationary | gear | mirror | school | stable | fuel | Street | truck | tap | sofa | bikini | postcard |
| anchor | pointer | diner | monkey | criminal | milkshake | lion | Handbag | overalls | information | pamphlet | chapel |
| dance | letter | fire | lunchbox | display counter | lawn mower | sport | exhibition | control | doctor | sports TV | accounts |
| mud | Reindeer | printer | bucket | candle | double bed | substitute | luggage | ladder | curtains | stop | dump |
| card | shower | pictures | coast | handouts | boat | breakfast | cottage | turn style | military | land | plunger |
| dung | sun | check-in | waiter | decoration | camera | coffee maker | pond | oven | fan | pool | tanker |