

## Supplementary material to accompany

‘Multiple dependencies and the role of grammar in real-time comprehension’

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## Experimental Materials

For each experiment, we present the full design for one item. Subsequent items are presented in an abbreviated format.

### Experiment 1

24 sets of 4 conditions organized in a  $2 \times 2$  factorial design that independently manipulated the conditions VP STRUCTURE and PLAUSIBILITY. A full set is presented below:

1. (a) VP STRUCTURE:*coordinate* / PLAUSIBILITY:*plausible*  
The immigrants who the FBI was illegally detaining and exhaustively interrogating for valuable intelligence were ultimately released.
- (b) VP STRUCTURE:*adjunct* / PLAUSIBILITY:*plausible*  
The immigrants who the FBI was illegally detaining while exhaustively interrogating the men for valuable intelligence were ultimately released.
- (c) VP STRUCTURE:*coordinate* / PLAUSIBILITY:*implausible*  
The boats which the FBI was illegally detaining and exhaustively interrogating for valuable intelligence were ultimately released.
- (d) VP STRUCTURE:*adjunct* / PLAUSIBILITY:*implausible*  
The boats which the FBI was illegally detaining while exhaustively interrogating the passengers for valuable intelligence were ultimately released.

For subsequent sets, the condition (a) sentence [coordinate/plausible] will be written in full. The implausible versions (c,d) are made by substituting the underlined filler with the word in square brackets and making the relativizer agree in animacy. The adjunct version (b,d) is made by first substituting the underlined coordinator with the word in curly brackets; then by inserting one of the phrases in parentheses at the second potential p-gap site. The first phrase in parentheses is inserted for the plausible version (b), and the second phrase for the implausible version (d).

2. The dissidents [newspapers] who the government was vehemently denouncing and {before} secretly jailing (the ringleaders | the publishers) without any charges ultimately issued retractions.
3. The band members [songs] who the fans were enthusiastically applauding and {before} wilding mobbing (the stage | the guitarist) during the big concert were on the radio program.
4. The suspects [allegations] who the police were quietly investigating but never {without ever} arresting (anyone | any suspects) for the robbery ultimately proved to be guilty.
5. The stocks [strategies] which the analyst was aggressively recommending but never {without ever} purchasing (any shares | any shares) for his own portfolio turned out to be scams.
6. The movies [actors] which the director was quickly filming and {while} simultaneously editing (the rough cuts | the footage) for early release performed well in the box office.

7. The tires [trucks] which the mechanic was expertly repairing and {before} fully inflating (the innertube | the tires) in his garage drove even better than before.
8. The programs [teachers] which the principal was formally reviewing or {after} temporarily canceling (funding | their classes) due to the budget shortfall were popular with students.
9. The patients [symptoms] who the doctor was frequently treating or {while} periodically visiting (their rooms | the patients) at the nursing home gradually became worse.
10. The horses [ranches] which the wolves were occasionally attacking and sometimes {without often} wounding (the mares | the livestock) before retreating into the hills always remained a bit skittish.
11. The wines [cheeses] which the gourmets were energetically discussing or {before} slowly sipping (the samples | some wine) during the banquet were rare imports from Italy.
12. The watches [bracelets] which the jeweler was obsessively polishing and {before} expertly calibrating (the clockwork | the watches) in respectful silence originally belonged to the former empress.
13. The vaccines [diseases] which the drug company was aggressively researching or {while} already manufacturing (test batches | vaccines) in the top-secret laboratory were considered major challenges in medicine.
14. The short stories [writers] which the publisher was summarily rejecting and {before} promptly shredding (their copies | their manuscripts) with sheer malice eventually won prestigious literary prizes.
15. The books [librarians] which the students were frequently consulting but never {without ever} borrowing (any copies | any books) for their class projects were worn from use.
16. The dogs [doghouses] which the attendant was badly washing or {while} sloppily grooming (the coats | its occupants) despite their matted fur soon developed a foul smell.
17. The tunes [instruments] which the pop star was hurriedly practicing or {after} hastily rewriting (the lyrics | song songs) in her private studio were formulaic and uninteresting.
18. The traffic lights [traffic officers] which the town council was newly installing or {after} thoroughly repairing (the circuitry | the patrol cars) for the downtown area cost the taxpayers a significant amount.
19. The rare vases [houses] which the archaeologist was often unearthing but {while} occasionally breaking (the fragile bones | the fragile vases) inside the abandoned caverns excited many historians of ancient civilizations.
20. The problems [articles] which the economist was always analyzing but never {without ever} solving (the equations | the equations) despite his best efforts are among the hardest in his field.
21. The butterflies [mountains] which the naturalist was routinely photographing or {after} heartlessly trapping (some specimens | some deer) in the alpine forests were members of an endangered species.
22. The mirrors [floors] which the movers were carelessly dusting but {after} cautiously hanging (the chandeliers | the mirrors) in the ballroom were priceless antiques from Morocco.
23. The facial hair [lawn] which the old man was neatly trimming or cautiously {without necessarily} plucking (his eyebrows | any weeds) in his bathroom would quickly grow out of control unless maintained weekly.
24. The country road [volcano] which the engineers were carefully surveying but {before} reluctantly paving {a portion | a road} for improved access was designated a protected landmark by the state.

## Experiment 2

24 sets of 4 conditions organized in a  $2 \times 2$  factorial design that independently manipulated the factors VP STRUCTURE and PLAUSIBILITY. A full set is presented below:

1. (a) VP STRUCTURE:*coordinate* / PLAUSIBILITY:*plausible*  
The acorns that the squirrels saw on the lawn and quickly crammed their small puffy cheeks with had fallen out of a magnificent oak tree.
- (b) VP STRUCTURE:*coordinate* / PLAUSIBILITY:*implausible*  
The cats that the squirrels saw on the lawn and quickly crammed their small puffy cheeks with had fallen out of a magnificent oak tree.
- (c) VP STRUCTURE:*single* / PLAUSIBILITY:*plausible*  
The acorns that the squirrels with the bushy black tails quickly crammed their small puffy cheeks with were basking in the warm summer sun.
- (d) VP STRUCTURE:*single* / PLAUSIBILITY:*implausible*  
The cats that the squirrels with the bushy black tails quickly crammed their small puffy cheeks with were basking in the warm summer sun.

For subsequent sets, the condition (a) sentence [coordinate/plausible] will be written in full. The implausible versions (b,d) are made by first substituting the underlined filler with the word in square brackets and making the relativizer agree in animacy. If there is an alternative matrix VP for an implausible condition, then it is indicated in square brackets and should be substituted for the original matrix VP, which is marked off with carets. The single VP versions (c,d) is made by deleting the first coordinate VP (underlined) and inserting the PP in curly brackets.

2. The experimental vaccine [notepad] that the scientist removed from his desk and {from the cancer research institute} carefully injected the white lab rat with after making some calculations ^ could potentially cure millions ^ [was covered in scribbles].
3. The powerful weedkiller [landscaping catalogues] that the gardener received in the mail and {at the prestigious country club} cautiously sprayed the heavily overgrown crabgrass with before mowing the lawn contained some potentially harmful chemicals.
4. The powdered sugar [old cookbook] that the baker took from the cabinet and {from the local pastry shop} lightly sprinkled the freshly baked cake with in the small kitchen ^ made a mess on the counter ^ [barely fit on the counter].
5. The antibacterial ointment [advice] that the doctor obtained from his colleague and {with the short white beard} gently brushed the little girl's wound with after she scraped her knee made her wince.
6. The rare antique silverware [professional waiters] that the chef found for his restaurant and {at the well-known gourmet restaurant} loosely packed a special padded drawer with in his private office ^ was used for visiting dignitaries ^ [served the guests skillfully].
7. The soft blankets [funny stores] that the nurses prepared for the children and {in the busy pediatric ward} delicately wrapped their vulnerable sick patients with during the night ^ were made from fine wool ^ [often cheered up the children].
8. The sticky oatmeal [scolding] that the disobedient toddler accepted from her mother and {with the unbearable temper tantrums} angrily smeared the recently painted wall with before running outside ^ was nearly impossible to clean off ^ [seemed harsh and unfair].

9. The therapeutic cream [pain pills] that the gymnast purchased from the drugstore and {with the long blonde hair} gingerly rubbed her throbbing injured shoulder with after she returned home allowed her to fall asleep comfortably.
10. The orange juice [stern lecture] that the frantic mother gave her song that morning and {with far too much work} unwittingly splashed the unfortunate young boy with while he was eating his breakfast ^ left a sticky spot on his shirt ^ [only made him late for the bus].
11. The paints [concepts] that the eccentric artist combined for his collage and {with the wild red hair} violently smeared the large white canvas with before covering it in photographs made the finished work vivid and compelling.
12. The aluminum foil [embarrassing situation] that the college freshman found in the shared kitchen and partially wrapped his broken TV antenna with before tuning in the basketball finals ^ actually belonged to his uptight neighbor ^ [quickly became campus gossip].
13. The cocoa powder [light bulb] that the sleepy man removed from the pantry and {with his eyes half closed} liberally sprinkled his freshly made coffee with while heating up a piece of cake ^ turned out to be infested with pests ^ [turned out to be infested with pests].
14. The white glue [stern warning] that the preschooler received from her teacher and {at the progressive arts school} unevenly brushed the construction paper shapes with before affixing some cotton balls ^ left sticky spots on her desk ^ [nearly brought her to tears].
15. The new antibiotic [accounting spreadsheets] that the inspector scrutinized with painstaking care and {from the state regulatory agency} cautiously injected the fearless clinical volunteers with before filing his report ^ was ultimately banned from the market ^ [were ultimately submitted and approved].
16. The loose valuables [sleeping children] that the inexperienced burglar found in the unlocked house and {without proper tools for robbery} hurriedly crammed his bulging coat pockets with before setting off the alarm ^ brought in little cash at the pawn shop ^ [were woken up by the loud siren].
17. The adhesive coating [computer program] that the talented engineer designed for his boss and {from the high-tech aerospace firm} methodically sprayed the special test surfaces with in his new laboratory could potentially make lots of money for the company.
18. The wet plaster {homemade lunch} that the handyman kept in a bucket and skillfully rubbed the crumbling old ceiling with before applying a coat of paint ^ was supposed to resist mold and rotting for decades ^ [was the envy of his coworkers].
19. The hot coffee [afternoon seminar] that the awkward professor prepared for his colleagues and accidentally splashed an unfortunate old man with in the cluttered lecture hall ^ soaked his tattered jacket ^ [covered several complex topics].
20. The expensive fabric [painters] that the interior decorator recommended for the living room and {with the spiky bleached hair} dramatically draped the dining room table with after newly upholstering the chairs ^ did not belong in a house with young children ^ [were unable to provide a reasonable estimate].
21. The old quilt [awkward situation] that the housekeeper discovered in the laundry room and {of the large colonial mansion} thoughtfully draped the soundly napping girl with before going out to run errands ^ was tattered but comforting ^ [was soon discussed throughout the neighborhood].
22. The thermal underwear [challenging peaks] that the mountain climber selected for his expedition and {from the predominantly flat country} efficiently packed his light durable

rucksack with after taking inventory of his rations ^ retained warmth even in sub-zero temperatures ^ [required special permits to climb].

23. The missing money [sleeping puppy] that the teenager spotted under the desk and { with the unnoticed kleptomaniac tendencies } furtively stuffed her hidden coat pocket with while cleaning the room ^ later turned up in the wash ^ [was awakened by the noise of the vacuum].
24. The many letters [powerful CEOs] that the volunteers wrote for the charity and { for the highly regarded charity } swiftly stuffed the recognizable yellow envelopes with after enclosing a glossy pamphlet were part of an emergency fund drive.

### **Experiment 3**

Experimental materials consisted of 24 sets of 4 conditions organized in a  $2 \times 2$  factorial design that independently manipulated the factors DEPENDENCY LENGTH and PLAUSIBILITY. A full set is presented below:

1. (a) DEPENDENCY LENGTH:*short* / PLAUSIBILITY:*plausible*  
The acorns that the squirrels quickly crammed their small puffy cheeks with had fallen out of a magnificent oak tree.
- (b) DEPENDENCY LENGTH:*short* / PLAUSIBILITY:*implausible*  
The cats that the squirrels quickly crammed their small puffy cheeks with had fallen out of a magnificent oak tree.
- (c) DEPENDENCY LENGTH:*long* / PLAUSIBILITY:*plausible*  
The acorns that the squirrels with the bushy black tails quickly crammed their small puffy cheeks with were basking in the warm summer sun.
- (d) DEPENDENCY LENGTH:*long* / PLAUSIBILITY:*implausible*  
The cats that the squirrels with the bushy black tails quickly crammed their small puffy cheeks with were basking in the warm summer sun.

The lexical content of these materials is identical to Experimental 2. To form each item set, take the corresponding VP STRUCTURE:*single* conditions from Experiment 2. These are the DEPENDENCY LENGTH:*long* conditions. Remove the five-word, subject-attached PP to form the DEPENDENCY LENGTH:*short* conditions.