

Pilot: Idea Generation with AI

Libraries

```
-- Attaching core tidyverse packages ----- tidyverse 2.0.0 --
v dplyr      1.1.4      v readr      2.1.5
v forcats    1.0.0      v stringr    1.5.1
v ggplot2    3.5.1      v tibble     3.2.1
v lubridate  1.9.3      v tidyr      1.3.1
v purrr      1.0.2
```

```
-- Conflicts ----- tidyverse_conflicts() --
```

```
x dplyr::filter() masks stats::filter()
```

```
x dplyr::lag()     masks stats::lag()
```

```
i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become
```

```
This is text (version 1.7.0).
```

```
Newer versions may have improved functions and updated defaults to reflect current understandings.
```

```
MacOS detected: Setting OpenMP environment variables to avoid potential crash due to libomp.dylib.
```

```
When using the L-BAM library, be aware that models may be downloaded from external sources. Use at your own risk.
```

```
The text package is provided 'as is' without any warranty of any kind.
```

```
For more information about the package see www.r-text.org and www.r-topics.org.
```

```
Attaching package: 'scales'
```

```
The following object is masked from 'package:purrr':
```

```
  discard
```

```
The following object is masked from 'package:readr':
```

```
  col_factor
```

```
Loading required package: Matrix
```

```
Attaching package: 'Matrix'
```

```
The following objects are masked from 'package:tidyr':
```

```
  expand, pack, unpack
```

```
Attaching package: 'simr'
```

```
The following object is masked from 'package:lme4':
```

```
  getData
```

The following object is masked from 'package:stringr':
fixed

Read the data

```
# Remove question text rows
pilot_data <- read_csv("data/pilot_2025.09.11.csv") %>%
  slice(-(1:2))
```

Rows: 47 Columns: 123

-- Column specification -----

Delimiter: ","

chr (123): StartDate, EndDate, Status, Progress, Duration (in seconds), Fini...

i Use `spec()` to retrieve the full column specification for this data.

i Specify the column types or set `show_col_types = FALSE` to quiet this message.

```
# Filter for participants who passed attention check
passed_attn_check <- pilot_data %>%
  filter(attn_check == "4" & attn_check_4_TEXT == "8")
```

Basic cleaning, memory check results

Near the end of the survey, we asked participants to recall the gist of the instruction text for the condition to which they were assigned. They picked from the multiple choice options of “Stay in control of the AI tool” (Pilot), “Let the AI tool do the heavy lifting” (Passenger), or “Don’t use AI” (Control).

38 out of 45 participants correctly recalled the gist of the instruction text. The 6 of the 7 participants who did not correctly recall the instruction text incorrectly selected “Stay in control of the AI tool,” suggesting that the options may have been unclear.

```
# Rename condition column

pilot_data_renamed <- passed_attn_check %>%
  rename(condition = FL_3_D0) %>%
  relocate(condition, .after = attn_check_4_TEXT) %>%
  mutate(condition = case_when(condition == "GuidedInstructions" ~ "Pilot",
                                condition == "UnguidedInstructions" ~ "Passenger",
                                condition == "ControlInstructions" ~ "Control"))
```

```

# Filter for participants who correctly answered the memory check question about the condition
# 1 = "Stay in control of the AI tool" (Pilot)
# 2 = "Let the AI tool do the heavy lifting (Passenger)
# 3 = "Don't use AI" (Control)

memory_check <- pilot_data_renamed %>%
  mutate(memory_check_condition = case_when(memory_check == "1" ~ "Pilot",
                                             memory_check == "2" ~ "Passenger",
                                             is.na(memory_check) ~ "Control")) %>%
  relocate(memory_check_condition, .after = "memory_check") %>%
  mutate(memory_check_result = if_else(condition == memory_check_condition, 1, 0)) %>%
  relocate(memory_check_result, .after = "memory_check_condition")

# Convert to long format
trial_data <- pilot_data_renamed %>%
  pivot_longer(names_to = "trial",
               values_to = "use",
               cols = starts_with(c("pilot", "pass", "control"))) %>%
  mutate(trial = str_remove(trial, "open_")) %>%
  filter(!is.na(use)) %>%
  relocate(trial, .after = "condition") %>%
  relocate(use, .after = "trial") %>%
  mutate(object = str_extract(trial, "(?<=_).*.") %>%
  mutate(object = str_remove(object, "_.*")) %>%
  relocate(object, .after = "trial") %>%
  mutate(object = if_else(object == "bubble", "bubblewrap", object))

write_csv(trial_data, "data/trial_data.csv")

```

Run ocsai model to automatically score originality

```
originality <- read_csv("data/trial_data_scored.csv")
```

Rows: 675 Columns: 84

-- Column specification -----

Delimiter: ","

chr (41): ResponseId, DistributionChannel, UserLanguage, condition, trial, ...

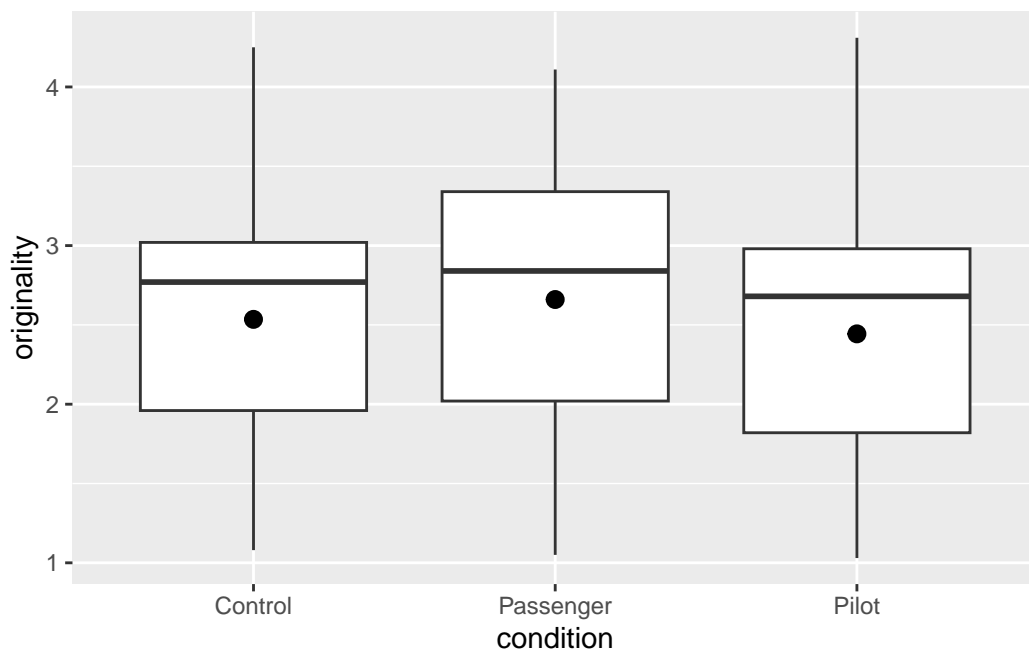
```
dbl (38): Status, Progress, Duration (in seconds), Finished, attn_check, at...
lgl (2): gender_4_TEXT, q3_totalPasteEventsfield
dtm (3): StartDate, EndDate, RecordedDate
```

i Use ``spec()`` to retrieve the full column specification for this data.
i Specify the column types or set ``show_col_types = FALSE`` to quiet this message.

```
# Add a column with trial number
originality_trials <- originality %>%
  mutate(trial_num = str_extract(trial, "(?<=_)[^_]*$")) %>%
  relocate(trial_num, .after = "trial")

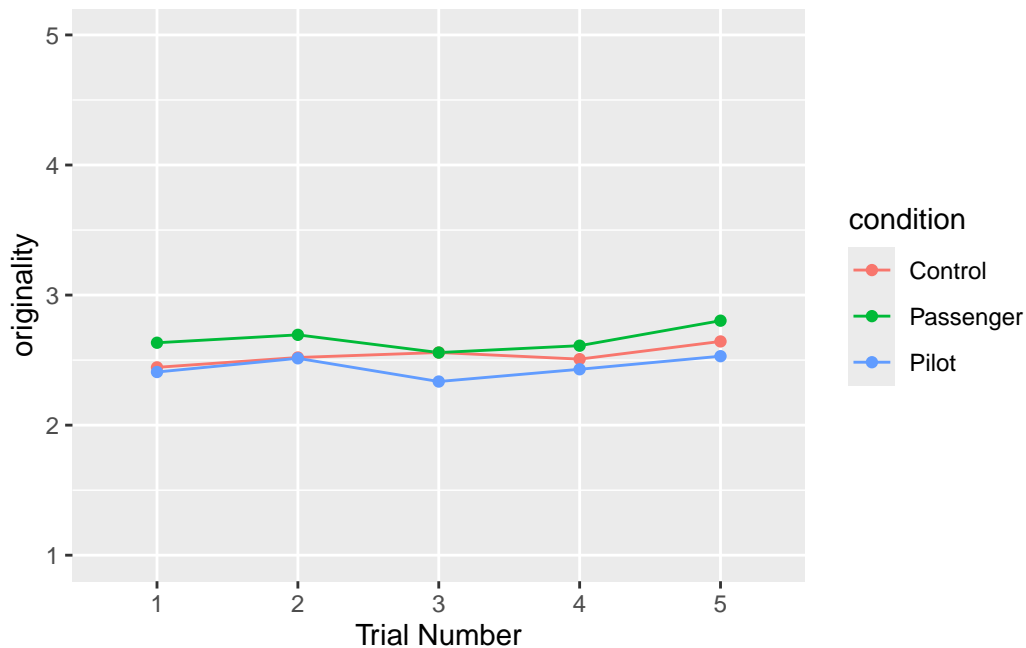
# Originality by condition
ggplot(originality, aes(x=condition, y=originality)) +
  geom_boxplot() +
  stat_summary(fun="mean")
```

Warning: Removed 3 rows containing missing values or values outside the scale range (``geom_segment()``).



```
# Plot originality over the course of the study
originality_trials %>%
  group_by(condition, trial_num) %>%
  summarize(originality = mean(originality)) %>%
  ggplot(aes(x=trial_num, y = originality, group=condition, color=condition)) +
  geom_line() +
  geom_point() +
  labs(x="Trial Number") +
  ylim(1,5)
```

`summarise()` has grouped output by 'condition'. You can override using the `groups` argument.



In this small sample of $N=15$ /condition, the Passenger condition had the most original responses (as scored by the model), followed by the Control condition, and then the Pilot condition.

Homogeneity analysis using sentence embedding model

```
options(digits=3)

# Group the uses by condition and object
trial_data %>%
  select(ResponseId, condition, object, use) %>%
  group_by(condition, object) %>%
  arrange(condition, object)
```

ResponseId	condition	object	use
R_5xAXCnsEvrtskwdNjr	stop		
R_5xAXCnsEvrtskwdNjr	press		
R_5xAXCnsEvrtskwdNjr	size weight		
R_5xAXCnsEvrtskwdNjr	inter		
R_5xAXCnsEvrtskwdNjr	end		
R_5KUC3StUlb5HPNOX	weight		
R_5KUC3StUlb5HPNOX	u		
R_5KUC3StUlb5HPNOX	on		
R_5KUC3StUlb5HPNOX	stop		
R_5KUC3StUlb5HPNOX	n		
R_5zr27YnLrFfignOG	okend		
R_5zr27YnLrFfignOG	door plant stand		
R_5zr27YnLrFfignOG	stop		
R_5zr27YnLrFfignOG	pping stone		
R_5zr27YnLrFfignOG	reative art canvas		
R_1YWGjncqdbffagIHd	a large outdoor planter in place during high wind.		
R_1YWGjncqdbffagIHd	as a doorstep.		
R_1YWGjncqdbffagIHd	to keep garage door slightly open for a pet cat to exit and enter a home.		
R_1YWGjncqdbffagIHd	up a faulty window and prevent it from closing.		
R_1YWGjncqdbffagIHd	the brick and display as art.		
R_5chnZnNtBnjQFHo	weigh down a tarp		
R_5chnZnNtBnjQFHo	ouse as a step-up		
R_5chnZnNtBnjQFHo	tie a rope to to keep something from blowing away		
R_5chnZnNtBnjQFHo	a stepping stone in a garden		
R_5chnZnNtBnjQFHo	a weapon		
R_7kHtB2Qv6FickXwvB	for a wood slab for a bed		
R_7kHtB2Qv6FickXwvB	shelf		
R_7kHtB2Qv6FickXwvB	stop		
R_7kHtB2Qv6FickXwvB	end		
R_7kHtB2Qv6FickXwvB	ow smasher		

Response additional subject use

R_6wovGohCWhidRJBing someone with it
R_6wovGohCWhidRJBing it as a weapon
R_6wovGohCWhidRJBing it to build a house
R_6wovGohCWhidRJBing it break something
R_6wovGohCWhidRJBing it to make something
R_5uWUutHFFEHuBV4 as a dong bell
R_5uWUutHFFEHuBV4 to as a car lift
R_5uWUutHFFEHuBV4 as a stool
R_5uWUutHFFEHuBV4 as a doorstep
R_5uWUutHFFEHuBV4 as a musical instrument
R_5LMGJvzLnKOPuR holes into the brick and place flowers
R_5LMGJvzLnKOPuR a candle holder
R_5LMGJvzLnKOPuR a mini sized fire pit grill
R_5LMGJvzLnKOPuR a stop for cars
R_5LMGJvzLnKOPuR stop something from moving like a lid on a top
R_8fDt5HPWIdq0lq1per weight
R_8fDt5HPWIdq0lq1personal defense tool
R_8fDt5HPWIdq0lq1or prop
R_8fDt5HPWIdq0lq1jet d'art
R_8fDt5HPWIdq0lq1cracker
R_6JaQ7b7ZBRHeysWto make a bookend
R_6JaQ7b7ZBRHeysWto create a small castle
R_6JaQ7b7ZBRHeysWte a sofa using only bricks
R_6JaQ7b7ZBRHeysWk briks to create a pedestal for plants
R_6JaQ7b7ZBRHeysWte a grill using bricks
R_6yDOWuWHLzK8ssex it up as a friend
R_6yDOWuWHLzK8ssex
R_6yDOWuWHLzK8ssex stop
R_6yDOWuWHLzK8ssex lego
R_6yDOWuWHLzK8ssex free bread impression
R_6YroCZZVb3A6g7paperweight
R_6YroCZZVb3A6g7on stop
R_6YroCZZVb3A6g7okend
R_6YroCZZVb3A6g7the elevation
R_6YroCZZVb3A6g7orration
R_57CpSkto9e6H7kinscratching block for my cat
R_57CpSkto9e6H7kinhold outdoor umbrella base down
R_57CpSkto9e6H7kinelated stand for cats food bowls
R_57CpSkto9e6H7kinPaint for outdoor decorative pathway
R_57CpSkto9e6H7kinhold down outdoor tarp covering something
R_6v1ESozwafDm5HUp stool

Response subject

R_6v1ESozwaRkn7Hr for very small child
R_6v1ESozwaRkn7Hr picnic blanket stabilizer
R_6v1ESozwaRkn7Hr table for Barbie Dolls
R_6v1ESozwaRkn7Hr cracker
R_5xAXCnsFovshkwnNjap toy
R_5xAXCnsFovshkwnNjap
R_5xAXCnsFovshkwnNjap
R_5xAXCnsFovshkwnNjap mat
R_5xAXCnsFovshkwnNjap stuffing
R_5KU63SULb5HFNQXp entertainment
R_5KU63SULb5HFNQXp
R_5KU63SULb5HFNQXp
R_5KU63SULb5HFNQXp proofing
R_5zr27YvNtRdlgn10Gaa decoration for gold food or drinks
R_5zr27YvNtRdlgn10Gaa cushion for sitting
R_5zr27YvNtRdlgn10Gaa protection
R_5zr27YvNtRdlgn10Gaa and craft material
R_5zr27YvNtRdlgn10Gaa Dampening
R_1YWGJongrdbFagkKwMa and use as a noise maker.
R_1YWGJongrdbFagkKwMa paper garbage bag to prevent liquids from leaking. can
R_1YWGJongrdbFagkKwMa it and display as art.
R_1YWGJongrdbFagkKwMa inside a vase to elevate artificial flowers for display.
R_1YWGJongrdbFagkKwMa landscape fabric to prevent weeds from growing around shrubs or
flowers in a yard.
R_5chnZcNiBnjQJFhr in a water trough to prevent freezing (I have done this)
R_5chnZcNiBnjQJFhr a planter to take up space
R_5chnZcNiBnjQJFhr a hanging pot for artificial plants - pierce the bubble wrap with the
stems
R_5chnZcNiBnjQJFhr between frying pans stacked in a cupboard for protection of pan
surfaces
R_5chnZcNiBnjQJFhr as insulation for PVC pipes during freezing weather
R_7kHtB2Qv6LbXFWa for a temporary cushion
R_7kHtB2Qv6LbXFWa paper liner for breakable items
R_7kHtB2Qv6LbXFWa for fun
R_7kHtB2Qv6LbXFWa for glove compartment
R_7kHtB2Qv6LbXFWa temporary rain hat
R_6wovGfCXpRJBing it as a stress reliever
R_6wovGfCXpRJBing it for a game
R_6wovGfCXpRJBing it to obscure something
R_6wovGfCXpRJBing it to confuse someone

Response to subject

R_6wovGhCXBpRMBgng it to protect items that are fragile

R_5uW0UitHUEHlBM4 relief

R_5uW0UitHUEHlBM4 same material

R_5uW0UitHUEHlBM4 ing pad

R_5uW0UitHUEHlBM4 mat

R_5uW0UitHUEHlBM4 sled

R_5LMGJvzFmNfORRp span object safe from damage

R_5LMGJvzFmNfORRp proof a room

R_5LMGJvzFmNfORRp knee pads on the floor

R_5LMGJvzFmNfORRp broken windows

R_5LMGJvzFmNfORRp ping for shoes

R_8fDt56PMBp0krap ing material

R_8fDt56PMBp0krap system

R_8fDt56PMBp0krap paper

R_8fDt56PMBp0krap ing

R_8fDt56PMBp0krap rug

R_6JaQ7b7ZBRHbWap sheets to make a soft play for kids

R_6JaQ7b7ZBRHbWap shet of bubblr to create a math

R_6JaQ7b7ZBRHbWap shet of bubbldr to create a costume

R_6JaQ7b7ZBRHbWap te windows

R_6JaQ7b7ZBRHbWap sheets of bubble to soundproof as room

R_6yDOWtWHzK6fap

R_6yDOWtWHzK6fap le flooring

R_6yDOWtWHzK6fap paper

R_6yDOWtWHzK6fap rap

R_6yDOWtWHzK6fap al handout

R_6YroCZZVqBA6g7rap drawers

R_6YroCZZVqBA6g7rap fun and jump on it

R_6YroCZZVqBA6g7rap keep purse shape

R_6YroCZZVqBA6g7rap on windows in the winter

R_6YroCZZVqBA6g7rap insulate plants

R_57CpSk09c6l7chBvrap on windows for insulsulation

R_57CpSk09c6l7chBvrap in tall boots in closet so they stand up and don't get all creased up
falling over

R_57CpSk09c6l7chBvrap in purses you aren't using so they don't lose their shape and get
squashed looking

R_57CpSk09c6l7chBvrap kids play with it cuz it's fun to pop bubbles

R_57CpSk09c6l7chBvrap void spaces at the bottom of decorative vases before adding fake
flowers

R_6v1ESoZwa12p7Hrap paper

R_6v1ESoZwa12p7Hrap

Response	Subject
R_6v1ESozwa12p15Hap	
R_6v1ESozwa12p15Hap	active steering wheel cover
R_6v1ESozwa12p15Hap	spry toy
R_5xAXCnsFwi4bkwNje	
R_5xAXCnsFwi4bkwNje	food bowl
R_5xAXCnsFwi4bkwNje	dish
R_5xAXCnsFwi4bkwNj	
R_5xAXCnsFwi4bkwNj	decoration
R_5KU638U65HBNQX	
R_5KU638U65HBNQXu	
R_5KU638U65HBNQXn	
R_5KU638U65HBNQXar	
R_5KU638U65HBNQXu	
R_5zr27YvNrfHsbnOG	Garden marker
R_5zr27YvNrfHsbnOG	all art
R_5zr27YvNrfHsbnOG	id feeder
R_5zr27YvNrfHsbnOG	erving tray
R_5zr27YvNrfHsbnOG	toy
R_1YWGjondhFShgHMe	as a bird bath.
R_1YWGjondhFShgHMe	int it and display as art.
R_1YWGjondhFShgHMe	hole in center and use as a baffle on a pole to prevent snakes from entering a bird house/nest.
R_1YWGjondhFShgHMe	as a jewelry box.
R_1YWGjondhFShgHMe	latch strings to use and tie on as a hat.
R_5chnZnNtHijQFHo	Water dish for dog
R_5chnZnNtHijQFHo	oop for soil
R_5chnZnNtHijQFHo	late/dish when camping
R_5chnZnNtHijQFHo	during a rainstorm
R_5chnZnNtHijQFHo	for a pot
R_7kHtB2Qv61shXaB	porary plate
R_7kHtB2Qv61shXaB	for items
R_7kHtB2Qv61shXaB	toy
R_7kHtB2Qv61shXaB	reshift fan
R_7kHtB2Qv61shXaB	bin
R_6wovGonCXpReBgin	ing it as a Plate
R_6wovGonCXpReBgin	ing it as a cushion
R_6wovGonCXpReBgin	ing it as something to bite onto when dealing extreme pain
R_6wovGonCXpReBgin	ing it as play item for dogs
R_6wovGonCXpReBgin	ing it as a mini shield
R_5uWUitHtETpBV4	plate dish
R_5uWUitHtETpBV4	er for dirt

Response id title subject

R_5uW0UhtHfEEdBV4 Cointerface BV4 water dish

R_5uW0UhtHfEEdBV4 Cointerface BV4 plate

R_5uW0UhtHfEEdBV4 Cointerface BV4 plate

R_5LMGJvzfnfNfOPs Ras a plate

R_5LMGJvzfnfNfOPs Ras a paint

R_5LMGJvzfnfNfOPs Ras a shovel

R_5LMGJvzfnfNfOPs Ras a marker on the ground

R_5LMGJvzfnfNfOPs Ras collect water

R_8fDt5bHPWfSh0qL Cointerface Sh0qL lantern

R_8fDt5bHPWfSh0qL Cointerface Sh0qL serving platter

R_8fDt5bHPWfSh0qL Cointerface Sh0qL fan

R_8fDt5bHPWfSh0qL Cointerface Sh0qL portable dog water bowl

R_8fDt5bHPWfSh0qL Cointerface Sh0qL feeder

R_6JaQ7b7ZFRHqyW Ras a plate for food

R_6JaQ7b7ZFRHqyW Ras a paint palette

R_6JaQ7b7ZFRHqyW Ras small holes and use as a plant saucer

R_6JaQ7b7ZFRHqyW Ras a shovel

R_6JaQ7b7ZFRHqyW Ras a snack tray

R_6yD0WnWfHfK8it Cointerface K8it plate for dog at park

R_6yD0WnWfHfK8it Cointerface K8it delivery

R_6yD0WnWfHfK8it Cointerface K8it footage

R_6yD0WnWfHfK8it Cointerface K8it disc golfers

R_6yD0WnWfHfK8it Cointerface K8it decor

R_6YroCZZWf3A6g7 Ras a tray

R_6YroCZZWf3A6g7 Ras a food bowl

R_6YroCZZWf3A6g7 Ras a wall art

R_6YroCZZWf3A6g7 Ras a frisbee clock

R_6YroCZZWf3A6g7 Ras a bowl for animal

R_57CpSlot9GfL7cm Cointerface L7cm place under furniture legs to move easily across floor

R_57CpSlot9GfL7cm Cointerface L7cm paper plate holder

R_57CpSlot9GfL7cm Cointerface L7cm roaster for cups

R_57CpSlot9GfL7cm Cointerface L7cm rain cover

R_57CpSlot9GfL7cm Cointerface L7cm pet food dish

R_6v1ESoZwfiSpas7H Cointerface pas7H plate

R_6v1ESoZwfiSpas7H Cointerface pas7H place marker for seats in a gym class

R_6v1ESoZwfiSpas7H Cointerface pas7H obstacles to hop over in an obstacle course

R_6v1ESoZwfiSpas7H Cointerface pas7H art base

R_6v1ESoZwfiSpas7H Cointerface pas7H handle free mini-umbrella

R_3EB0Rass0QnkaQfRT Ras a brick bookend or paperweight

R_3EB0Rass0QnkaQfRT Ras a brick sculpture or artistic installation

R_3EB0Rass0QnkaQfRT Ras a brick barbecue grill

Response to subject

R_3EB0Pass00QmK1M1 Making a decorative brick wall art piece

R_3EB0Pass00QmK1M1 Making a shelf for items

R_7w47Pass00QmK1M1 Phone amplifier

R_7w47Pass00QmK1M1 Wooden key holder

R_7w47Pass00QmK1M1 Book Press

R_7w47Pass00QmK1M1 Portable fitness tool

R_7w47Pass00QmK1M1 Bar oven battery

R_7CNPAss00QmK1M1 Painted garden ornaments

R_7CNPAss00QmK1M1 Brick accent wall

R_7CNPAss00QmK1M1 Plant stand

R_7CNPAss00QmK1M1 Outdoor fireplace

R_7CNPAss00QmK1M1 Work out equipment

R_5ZDIPass00QmK1M1 Make a pet maze for your ginnea pig

R_5ZDIPass00QmK1M1 How out for candle holder

R_5ZDIPass00QmK1M1 Clock wall clock one brick for each hour

R_5ZDIPass00QmK1M1 Board stand

R_5ZDIPass00QmK1M1 Sculpture out of bricks

R_6pH.PAss00QmK1M1 Bookends

R_6pH.PAss00QmK1M1 Oven marker

R_6pH.PAss00QmK1M1 Restop

R_6pH.PAss00QmK1M1 Outdoor candle holder

R_6pH.PAss00QmK1M1 Hammer weight

R_562RPass00QmK1M1 Mailbox stand

R_562RPass00QmK1M1 Base for a coffee table

R_562RPass00QmK1M1 Wood to create a wine raft

R_562RPass00QmK1M1 Brick archway over your door

R_562RPass00QmK1M1 Wall-mounted brick key holder

R_5qgfPass00QmK1M1 Restop

R_5qgfPass00QmK1M1 Clock end

R_5qgfPass00QmK1M1 Hammer weight

R_5qgfPass00QmK1M1 Candle holder

R_5qgfPass00QmK1M1 Cup with foil to make a weight to hold half chicken down on the grill for better contact cooking

R_1411R6EEhN6K1M1 Build a raised planter box using bricks

R_1411R6EEhN6K1M1 Use brick veneer or thin bricks to add texture and warmth to a room by creating a feature wall

R_1411R6EEhN6K1M1 Build your own outdoor pizza oven using bricks

R_1411R6EEhN6K1M1 Construct a brick fireplace

R_1411R6EEhN6K1M1 Construct a brick dog house

R_7wP9Pass00QmK1M1 Bookend

R_7wP9Pass00QmK1M1 Red garden bed border

Response ID	Subject
R_7wP9HAG3b7gAdE10Q1P	Indoor weights
R_7wP9HAG3b7gAdE10Q1P	Indoor stop
R_7wP9HAG3b7gAdE10Q1P	Indoor fire pit
R_32in8Passobg1ki7Dokend	Indoor
R_32in8Passobg1ki7Dokend	Indoor marker
R_32in8Passobg1ki7Dokend	Indoor stop
R_32in8Passobg1ki7Dokend	Indoor weight
R_32in8Passobg1ki7Dokend	Indoor oven
R_6497Ras9ch9RgBai	Indoor game for kids-align bricks to form messages to send back and forth to a friend. Both have a large number of bricks to arrange.
R_6497Ras9ch9RgBai	Indoor planters in various sizes and shapes
R_6497Ras9ch9RgBai	Indoor a backyard miniature golf course with bricks as the sidewalls
R_6497Ras9ch9RgBai	Indoor a jinga like game stacking bricks
R_6497Ras9ch9RgBai	Indoor a brick as a paper weigh while outdoor newspaper reading to keep other sections from blowing away
R_73eCBassobg1ki7Dokend	Indoor use a brick to flatten my pokemon cards for grading
R_73eCBassobg1ki7Dokend	Indoor use a brick as steps for a staircase when nothing else is possible.
R_73eCBassobg1ki7Dokend	Indoor embedding LEDs into a brick so that you can place it somewhere and it will light up with various colors, add in sensor to light up when someone walks on it.
R_73eCBassobg1ki7Dokend	Indoor carving out the insides of a brick to attach tubes inside which will stabilize the tubes and prevent them from bending.
R_73eCBassobg1ki7Dokend	Indoor sterilize and heat the brick to extreme temperatures, then drop an egg on top to cook the egg
R_5bPIRksw1L8ndG	Indoor Garden edging
R_5bPIRksw1L8ndG	Indoor Bookends
R_5bPIRksw1L8ndG	Indoor outdoor seating
R_5bPIRksw1L8ndG	Indoor doorstop
R_5bPIRksw1L8ndG	Indoor planters
R_7dyVzSD7gVks1J	Indoor Build a house
R_7dyVzSD7gVks1J	Indoor doorstop
R_7dyVzSD7gVks1J	Indoor Garden border
R_7dyVzSD7gVks1J	Indoor handle holder
R_7dyVzSD7gVks1J	Indoor photo display
R_6sSfyRas9ch9RgBai	Indoor Brick wall art
R_6sSfyRas9ch9RgBai	Indoor outdoor kitchen
R_6sSfyRas9ch9RgBai	Indoor Bookends
R_6sSfyRas9ch9RgBai	Indoor Garden edging
R_6sSfyRas9ch9RgBai	Indoor Brick planter box
R_3EB0Ras9ch9RgBai	Indoor Mosaic
R_3EB0Ras9ch9RgBai	Indoor for arts to create unique textures

Response to subject

R_3EB0Pass00Qm16Q1R1: Canning: Line plant pots with bubble wrap to help retain moisture

R_3EB0Pass00Qm16Q1R1: Canning material for keyboard

R_3EB0Pass00Qm16Q1R1: Canning percussion instrument by wrapping bubble wrap around a box or container to make a unique sound

R_7w47Pass00Qm16Q1R1: Canning proofing panels

R_7w47Pass00Qm16Q1R1: Canning hydroponics starter

R_7w47Pass00Qm16Q1R1: Canning pressed art stamps

R_7w47Pass00Qm16Q1R1: Canning Wearable Insulation fashion

R_7w47Pass00Qm16Q1R1: Canning emergency cold hot pack

R_7CNPAss00Qm16Q1R1: Canning surface for painting

R_7CNPAss00Qm16Q1R1: Canning relief

R_7CNPAss00Qm16Q1R1: Canning window insulation

R_7CNPAss00Qm16Q1R1: Canning proofing

R_7CNPAss00Qm16Q1R1: Canning protective cushion

R_5ZDIPass00Qm16Q1R1: Canning use as a stamp

R_5ZDIPass00Qm16Q1R1: Canning temporary insulation on windows

R_5ZDIPass00Qm16Q1R1: Canning bubbles to release stress

R_5ZDIPass00Qm16Q1R1: Canning kiddie pool for kids to play in and pop

R_5ZDIPass00Qm16Q1R1: Canning colored bubble wrap into pieces and create a mosaic art piece

R_6pH.Pass00Qm16Q1R1: Canning projects

R_6pH.Pass00Qm16Q1R1: Canning reliever

R_6pH.Pass00Qm16Q1R1: Canning cushion

R_6pH.Pass00Qm16Q1R1: Canning cushioning

R_6pH.Pass00Qm16Q1R1: Canning Organizer

R_562RPAAss00Qm16Q1R1: Canning proofing

R_562RPAAss00Qm16Q1R1: Canning paint a texture on walls

R_562RPAAss00Qm16Q1R1: Canning around a photo frame

R_562RPAAss00Qm16Q1R1: Canning wall collage

R_562RPAAss00Qm16Q1R1: Canning unique rug

R_5qgfVHAss00Qm16Q1R1: Canning insulate windows

R_5qgfVHAss00Qm16Q1R1: Canning a non-slip surface

R_5qgfVHAss00Qm16Q1R1: Canning fragile items before storing or moving them

R_5qgfVHAss00Qm16Q1R1: Canning draft drafts around windows or doors

R_5qgfVHAss00Qm16Q1R1: Canning sharp edges of countertops or furniture

R_1411R6FEENM16Q1R1: Canning as a cushioning material for protecting the floor and carpet when placing heavy appliances and furniture in the house

R_1411R6FEENM16Q1R1: Canning a bubble wrap costume or prop for a fun photoshoot or event.

R_1411R6FEENM16Q1R1: Canning as a protective layer for fragile items when moving or shipping

R_1411R6FEENM16Q1R1: Canning pit into a stress-relief toy by popping the bubbles

R_1411R6FEENM16Q1R1: Canning bubble wrap art by painting on the bubbles and pressing them onto paper.

Response	Subject
R_7dyVZB9ZgWbKj	Wrap texture in art projects
R_6sSfyBdFEbNHWW	Wrap relief
R_6sSfyBdFEbNHWW	Wrap fragile items
R_6sSfyBdFEbNHWW	Wrap
R_6sSfyBdFEbNHWW	Wrap painting
R_6sSfyBdFEbNHWW	Wrap for toy cars
R_3EBdPss0G0bma	Plate
R_3EBdPss0G0bma	Shift fan
R_3EBdPss0G0bma	Clock
R_3EBdPss0G0bma	Shift sled
R_3EBdPss0G0bma	Toy in a pool or bathtub
R_7w47Ras0b0fBQ	Table cutting board
R_7w47Ras0b0fBQ	Mirror
R_7w47Ras0b0fBQ	Water dish
R_7w47Ras0b0fBQ	Emergency shovel
R_7w47Ras0b0fBQ	Pot drip tray
R_7CNPWss0G0bma	Plate
R_7CNPWss0G0bma	Painting canvas
R_7CNPWss0G0bma	Target practice with water guns
R_7CNPWss0G0bma	Art
R_7CNPWss0G0bma	Bowl
R_5ZDIPss0G0bma	
R_5ZDIPss0G0bma	Stick and make a hand fan
R_5ZDIPss0G0bma	He a giant coin and play heads or tails
R_5ZDIPss0G0bma	Shingles
R_5ZDIPss0G0bma	Relief with varying lengths of frisbees
R_6pHdPss0G0bma	Free gold
R_6pHdPss0G0bma	Obstacle course
R_6pHdPss0G0bma	Frisee
R_6pHdPss0G0bma	Shift plate for a picnic
R_6pHdPss0G0bma	Playing frisbee tic-tac-toe on the beach.
R_562RAs0G0bma	Coordination by balancing the frisbee on different body parts
R_562RAs0G0bma	Put one into a dance routine
R_562RAs0G0bma	Pop balloons on a wall with a frisbee
R_562RAs0G0bma	Many times you can flip the frisbee in the air before you catch it
R_562RAs0G0bma	Use as fun paper plate holders at a picnic
R_5qgfHAs0G0bma	Plate
R_5qgfHAs0G0bma	Background for an award plate
R_5qgfHAs0G0bma	Make a hanging mobile for a child's room
R_5qgfHAs0G0bma	Use several of them to put under furniture legs to make moving furniture easier

Response	id	subject
R_5qgf	1145	Use as a drip catcher for plants
R_1411	665	Frisbee target practice
R_1411	665	Frisbee bowling: Set up empty bottles or cans as pins and try to knock them down by throwing the frisbee like a bowling ball
R_1411	665	Frisbee art: Dip the frisbee in paint and use it as a stamp to create unique patterns on paper or fabric.
R_1411	665	Frisbee toss and catch: Play a game where you and a partner see how many times you can throw and catch the frisbee without dropping it
R_1411	665	Use the Frisbee as a tray to serve drinks at a picnic
R_7wP	914	Concentrates sunlight to warm or gently cook food, melt snow, or heat water during picnics.
R_7wP	914	Keeps young plants warm and pest-free and speeds germination, simple, reusable, and compact.
R_7wP	914	Cheap way to make uniform garden stepping-stones, coasters, or wall art with a cool circular shape.
R_7wP	914	Batteries, instantly louder audio for outdoor gatherings or campsite music
R_7wP	914	percussion instrument
R_32in	845	wind chime
R_32in	845	tic tac toe
R_32in	845	plate toss
R_32in	845	frisbee obstacle course
R_32in	845	frisbee dance party
R_6497	1495	Get a set of plastic bowling pins and try to knock them down with a frisbee using regular bowling rules. It is played best by getting two set of pins and playing opposite a partner, so you can both reset the pins and retrieve the frisbee.
R_6497	1495	Use the frisbee as a baton in a relay race.
R_6497	1495	Use as outdoor food tray for a party
R_6497	1495	Use as a reminder your potted plants to catch the drips
R_6497	1495	Use as a pinch use it as a water bowl for your dog
R_73eC	1495	Use the frisbee as a transportation mechanism to bring my pokemon card from one person to another.
R_73eC	1495	Turn it into a clock by adding number and hands
R_73eC	1495	Use it as a fan for when its hot as hell
R_73eC	1495	Use it as a game of tag so when someone gets hit with the frisbee they're it
R_73eC	1495	Hang the frisbee off a tree and create a bird's nest with it then place seeds inside.
R_5bPI	1495	frisbee golf
R_5bPI	1495	frisbee tic-tac-toe
R_5bPI	1495	frisbee target practice

Response	Subject
R_5bPIRkWiFhShedFrisbee	Frisbee toss challenge
R_5bPIRkWiFhShedFrisbee	Frisbee relay race
R_7dyVzSDZigVbCjports	ports
R_7dyVzSDZigVbCjog toy	og toy
R_7dyVzSDZigVbCjlate	late
R_7dyVzSDZigVbCjdisc golf	disc golf
R_7dyVzSDZigVbCjase for a DIY clock	ase for a DIY clock
R_6sSfyAaSEnagpWYrarget practice	target practice
R_6sSfyAaSEnagpWYr-tac-toe	-tac-toe
R_6sSfyAaSEnagpWYrisbee relay race	risbee relay race
R_6sSfyAaSEnagpWYrisbee art	risbee art
R_6sSfyAaSEnagpWYrisbee golf	risbee golf
R_18EDP14NtA80c2F8Jit as a stopper	it as a stopper
R_18EDP14NtA80c2F8Jake a table	ake a table
R_18EDP14NtA80c2F8Jake a stove	ake a stove
R_18EDP14NtA80c2F8Jake decorative wall	ake decorative wall
R_18EDP14NtA80c2F8Jake pathway	ake pathway
R_1dt5A6ldtzBF7kGAeight for sinking dead bodies	eight for sinking dead bodies
R_1dt5A6ldtzBF7kGAarden border	arden border
R_1dt5A6ldtzBF7kGAepping stones	epping stones
R_1dt5A6ldtzBF7kGAess for cuban sandwiches	ess for cuban sandwiches
R_1dt5A6ldtzBF7kGAy BBQ pit	ay BBQ pit
R_51GSrWAAbWkCB3Zen marker	en marker
R_51GSrWAAbWkCB3Zends	ends
R_51GSrWAAbWkCB3Zobell	obell
R_51GSrWAAbWkCB3Zopener	opener
R_51GSrWAAbWkCB3Zer	er
R_5rdONtddBlicDMyding stool	ding stool
R_5rdONtddBlicDMydstop	dstop
R_5rdONtddBlicDMydblock	dblock
R_5rdONtddBlicDMyd weight	d weight
R_5rdONtddBlicDMydn	n
R_5nJRFt8fKMwd1585okshelves	okshelves
R_5nJRFt8fKMwd1585anters	anters
R_5nJRFt8fKMwd1585hways	hways
R_5nJRFt8fKMwd1585orstop	orstop
R_5nJRFt8fKMwd1585er	er
R_1oteCHsebkichnDoor stopper	Door stopper
R_1oteCHsebkichnBalance callibration	Balance callibration
R_1oteCHsebkichnBookend	Bookend
R_1oteCHsebkichnTable leveler	Table leveler

Response to subject

R_1oteCHsebkidChalk marker

R_7oQJPI0jxBrEDbricks for pets to jump over

R_7oQJPI0jxBrEDbricks for decoration

R_7oQJPI0jxBrEDbricks as a step

R_7oQJPI0jxBrEDbricks to reach something

R_7oQJPI0jxBrEDbricks for holding papers down

R_7FetIPdtB8gCNCover a brick with fabric and use it as a door stopper

R_7FetIPdtB8gCNCStack bricks between boards to make a bookshelf

R_7FetIPdtB8gCNPaint a brick as a decorative object

R_7FetIPdtB8gCNDine a sidewalk or path with bricks to define the path

R_7FetIPdtB8gCNCAn covered brick makes a nice paperweight.

R_5e6zRqChHsCEBPlace a brick on its side and use it as a rustic candle holder for a cozy atmosphere

R_5e6zRqChHsCEBPaint and label bricks to use as markers for different herbs in your indoor or outdoor garden

R_5e6zRqChHsCEBncorporate a brick into your yoga practice as a prop for balance or support during poses

R_5e6zRqChHsCEBStack and arrange bricks creatively to make a unique DIY bookshelf or display shelf

R_5e6zRqChHsCEBUse bricks to create a charming garden path in your backyard or front yard

R_1eTQidB7aenWbgEPapon

R_1eTQidB7aenWbgEPor jamb

R_1eTQidB7aenWbgEPokend

R_1eTQidB7aenWbgEPindow prop

R_1eTQidB7aenWbgEPcoration

R_1ozr7aalkaV3YgMziPaint a picture on it

R_1ozr7aalkaV3YgMzWeapon

R_1ozr7aalkaV3YgMzook ends

R_1ozr7aalkaV3YgMzshelf supports

R_1ozr7aalkaV3YgMzuild a wall

R_7EE8376fIBQdaH2Dokend

R_7EE8376fIBQdaH2Dden Marker

R_7EE8376fIBQdaH2Dorstop

R_7EE8376fIBQdaH2IYSpeaker

R_7EE8376fIBQdaH2Ddoor Game

R_1tljMRijR96fCHWIIY Garden Markers

R_1tljMRijR96fCHWBookends

R_1tljMRijR96fCHWOutdoor Ottoman

R_1tljMRijR96fCHWweight for Exercise

R_1tljMRijR96fCHWoor Stop

R_7oQ.P110jx5o5BDeWap holding something on refrigerator
R_7oQ.P110jx5o5BDeWap repairing TV
R_7oQ.P110jx5o5BDeWap holding books together
R_7oQ.P110jx5o5BDeWap holding DVDs together
R_7Fet1P10tB8gC6NWrap up someone like a mummy
R_7Fet1P10tB8gC6NWrap a bubble-popping party
R_7Fet1P10tB8gC6NWrap bubble wrap to insulate windows
R_7Fet1P10tB8gC6NWrap bubble wrap as a cushion
R_7Fet1P10tB8gC6NWrap bubble wrap painting, dipping it in water color paint and making a work of art
R_5e6znP10tHsbE1KWrap a DIY bubble wrap mold by shaping it around an object and using resin to form a custom protective casing
R_5e6znP10tHsbE1KWrap a soundproofing panel by sandwiching bubble wrap between layers of fabric or cardboard to reduce noise
R_5e6znP10tHsbE1KWrap a DIY padded mousepad or wrist rest for your computer desk
R_5e6znP10tHsbE1KWrap protecting plants from frost by wrapping pots with bubble wrap to insulate them
R_5e6znP10tHsbE1KWrap preventing drafts by placing bubble wrap insulation in gaps around windows and doors
R_1eTQ1dB7a0Nw1gRWrap
R_1eTQ1dB7a0Nw1gRWrap
R_1eTQ1dB7a0Nw1gRWrap
R_1eTQ1dB7a0Nw1gRWrap stuffing
R_1eTQ1dB7a0Nw1gRWrap
R_1ozr7a1kkaV3Mg1MWrap lever
R_1ozr7a1kkaV3Mg1MWrap bubble popping game
R_1ozr7a1kkaV3Mg1MWrap play top
R_1ozr7a1kkaV3Mg1MWrap on it
R_1ozr7a1kkaV3Mg1MWrap
R_7EE8376f1BQhaleZDap protective layer when mailing fragile items
R_7EE8376f1BQhaleZDap a DIY stress relief toy by popping the bubbles.
R_7EE8376f1BQhaleZDap as cushioning for storage to protect delicate items.
R_7EE8376f1BQhaleZDap it into small pieces and use it as a textured surface for art projects.
R_7EE8376f1BQhaleZDap it around your feet and slide around on hardwood floors for a fun indoor game.
R_1tljMR1jR906H1WWrap project
R_1tljMR1jR906H1WWrap stress relief
R_1tljMR1jR906H1WWrap
R_1tljMR1jR906H1WWrap material
R_1tljMR1jR906H1WWrap floor
R_79gDP1d1lmb63CWrap relief

Response addition subject

R_79gDPI01hmb636suspension
R_79gDPI01hmb636wrapping material
R_79gDPI01hmb636outdoor cushion
R_79gDPI01hmb636table wrap art
R_6NCWIDqWbblh6K16inflating bubbles to relieve stress
R_6NCWIDqWbblh6K16cooling
R_6NCWIDqWbblh6K16simulate plants
R_6NCWIDqWbblh6K16padding
R_6NCWIDqWbblh6K16divider
R_18EDP24Nf80b2F8J use it as a tray
R_18EDP24Nf80b2F8J fine decor
R_18EDP24Nf80b2F8J swatter
R_18EDP24Nf80b2F8J a fan
R_18EDP24Nf80b2F8J a lid
R_1dt5A6lhtzlfF7hrcGA Actus garden
R_1dt5A6lhtzlfF7hrcGA water dish for pets
R_1dt5A6lhtzlfF7hrcGA whimsical hat
R_1dt5A6lhtzlfF7hrcGA insect umbrella
R_1dt5A6lhtzlfF7hrcGA all clock
R_51GSrWA6Wtlk6B3Z
R_51GSrWA6Wtlk6B3Z decor
R_51GSrWA6Wtlk6B3Z ten art
R_51GSrWA6Wtlk6B3Z bowl
R_51GSrWA6Wtlk6B3Z swatter
R_5rdONtclLispDmWd tray or plate
R_5rdONtclLispDmWd bowl for a pet
R_5rdONtclLispDmWd spinning top toy
R_5rdONtclLispDmWd swatter
R_5rdONtclLispDmWd
R_5nJRFH86KNv1585 tray
R_5nJRFH86KNv1585 naments
R_5nJRFH86KNv1585 swatter
R_5nJRFH86KNv1585 ol for hamsters
R_5nJRFH86KNv1585 paint palette
R_1oteCHoeKlshmdTray
R_1oteCHoeKlshmdPaint holder
R_1oteCHoeKlshmdLast minute fan
R_1oteCHoeKlshmdWater holder
R_1oteCHoeKlshmdClock face
R_7oQJPI0jxfroFDstoring coins
R_7oQJPI0jxfroFDst a hat

Response addition subject use

- R_7oQJPI10jxfrfBDas a water dish for cat
- R_7oQJPI10jxfrfBDas a plate
- R_7oQJPI10jxfrfBDfor collecting votes
- R_7FetlPpDtP8glCENisbee golf, using objects as targets
- R_7FetlPpDtP8glCENisbee tic-tac-toe, with 2 different colored Frisbees in place of X and O
- R_7FetlPpDtP8glCENarget practice, aiming for a target with the Frisbee
- R_7FetlPpDtP8glCENelay race, with participants throwing Frisbee to each other while completing the race
- R_7FetlPpDtP8glCENick shot challenge
- R_5e6znPQChiffisEBDip the frisbee in different colored paints, then spin and toss it onto a large canvas or sheet of paper to create a vibrant and abstract painting
- R_5e6znPQChiffisEBPlace a piece of paper on an old record player, drip paint on it, then spin the record player and toss the frisbee onto the surface to create colorful spin art designs
- R_5e6znPQChiffisEBG glue small colorful pieces of paper, fabric, or other materials onto a frisbee to create a unique mosaic design
- R_5e6znPQChiffisEBDrill holes around the edge of a frisbee and attach strings with beads or metal pieces. Hang it outside to create a musical wind chime when the frisbee spins in the wind
- R_5e6znPQChiffisEBPaint the frisbee with transparent colors or glue on pieces of colored cellophane to create a beautiful suncatcher that reflects light and creates patterns when hung in a sunny window
- R_1eTQidB7frNvelgRmer plate
- R_1eTQidB7frNvelgRd feeder
- R_1eTQidB7frNvelgR dish
- R_1eTQidB7frNvelgRster
- R_1eTQidB7frNvelgRcap
- R_1ozr7AukkaV3YgchZ food dish
- R_1ozr7AukkaV3YgchZrge coaster
- R_1ozr7AukkaV3YgchZlate
- R_1ozr7AukkaV3YgchZlanter for herbs
- R_1ozr7AukkaV3YgchZp dish
- R_7EE8376fI8QkehZDy traditional frisbee games
- R_7EE8376fI8QkehZDtable pet food dish
- R_7EE8376fI8QkehZDdry scoop
- R_7EE8376fI8QkehZDergency signal mirror
- R_7EE8376fI8QkehZDi garden planter
- R_1tljMRjR900DWse it as a makeshift plate or tray for carrying snacks and drinks at a picnic or outdoor gathering
- R_1tljMRjR900DWurn it upside down and use it as a mini table for playing card games or holding small items like keys and sunglasses

Response condition object use

R_1tljMRjR9000W Play a game of "Frisbee golf" by setting up targets around a park or backyard and trying to hit them with the frisbee

R_1tljMRjR9000W Use it as a canvas for painting or decorating to create unique wall art or a personalized gift

R_1tljMRjR9000W Practice your juggling skills by throwing and catching multiple frisbees in the air.

R_79gDPi01frind63fr Frisbee golf

R_79gDPi01frind63fr Frisbee target practice

R_79gDPi01frind63fr Frisbee plate

R_79gDPi01frind63fr Ultimate frisbee

R_79gDPi01frind63fr Portable dog water bowl

R_6NCWidqWshdysKpG Wipe snow off windshield

R_6NCWidqWshdysKpG dog poop

R_6NCWidqWshdysKpG Can

R_6NCWidqWshdysKpG a plate

R_6NCWidqWshdysKpG

```
# Use sentence transformers model in Python to analyze semantic similarity
semantic_similarities <- read_csv("data/semantic_similarities.csv")
```

Rows: 24975 Columns: 3

```
-- Column specification -----
Delimiter: ","
chr (2): condition, object
dbl (1): similarity
```

```
i Use `spec()` to retrieve the full column specification for this data.
i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```
semantic_similarities_summary <- read_csv("data/semantic_similarity_summary.csv")
```

Rows: 3 Columns: 3

```
-- Column specification -----
Delimiter: ","
chr (1): condition
dbl (2): mean, std
```

```
i Use `spec()` to retrieve the full column specification for this data.
i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

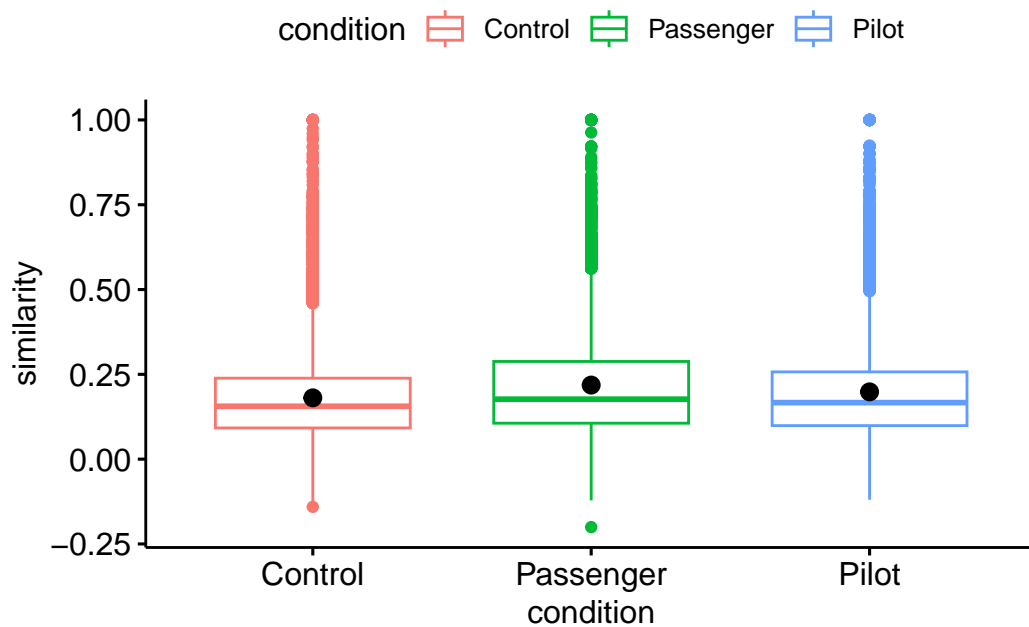


```
semantic_similarities %>%
  group_by(condition) %>%
  summarize(mean_similarity = mean(similarity),
            sd_similarity = sd(similarity)) %>%
  arrange(desc(mean_similarity))
```

condition	mean_similarity	sd_similarity
Passenger	0.218	0.169
Pilot	0.198	0.158
Control	0.181	0.141

```
ggboxplot(semantic_similarities, x="condition", y="similarity", color="condition") +
  stat_summary(fun="mean")
```

Warning: Removed 3 rows containing missing values or values outside the scale range (`geom_segment()`).



The Passenger condition had the greatest semantic similarity among ideas, followed by the Pilot condition, and then Control condition.

Crowdsourced evaluations of creativity

The next step will be to have another set of crowdworkers evaluate the creativity of the pilot participants' ideas in terms of overall creativity, originality, and usefulness.

```
# Prepare idea submissions dataset for evaluation by another group of crowdworkers
# The data needs to be in long format, where each row represents a single idea for a single condition

# In case you want to view wide
idea_submissions_wide <- trial_data %>%
  mutate(trial = str_extract(trial, "([A-Za-z0-9]+)(_)([A-Za-z0-9]+)$")) %>%
  pivot_wider(id_cols = c("ResponseId", "condition", "process_open-ended"),
              names_from = "trial",
              values_from = "use")

idea_submissions_long <- trial_data %>%
  unite(col = "idea_id", ResponseId, trial, sep="-")

write_csv(idea_submissions_long, "data/idea_submissions.csv")

# Create separate csvs for frisbee, brick, and bubblewrap
frisbee_submissions <- idea_submissions_long %>%
  filter(object=="frisbee")

brick_submissions <- idea_submissions_long %>%
  filter(object=="brick")

bubble_submissions <- idea_submissions_long %>%
  filter(object=="bubblewrap")

# Save to csvs

write_csv(frisbee_submissions, "data/frisbee_submissions.csv")
write_csv(brick_submissions, "data/brick_submissions.csv")
write_csv(bubble_submissions, "data/bubble_submissions.csv")
```

Analysis of crowdworkers' subjective evaluations

N = 99 participants

```
# Read in the crowdworker evaluations
# Each row represents a crowdworkers' responses. The data is super wide because each column represents a different trial.
# First, wrangle the data so that the column format is similar to the pilot study data: first, read in the data.

crowdworkers <- read_csv("data/crowdworker_eval_2025.09.18.csv")
```

```
Rows: 107 Columns: 2048
```

```
-- Column specification -----
```

```
Delimiter: ","
```

```
chr (2048): StartDate, EndDate, Status, Progress, Duration (in seconds), Fin...
```

```
i Use `spec()` to retrieve the full column specification for this data.
```

```
i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```
# Check which idea submitter is tied to which crowdworker
submitter_ids <- crowdworkers %>%
  slice_head(n=1) %>%
  pivot_longer(cols = 14:2038,
               names_to = "participant_trial",
               values_to = "submitter_id") %>%
  select(participant_trial, submitter_id) %>%
  mutate(submitter_id = str_extract(submitter_id, "R_[A-Za-z0-9]+")) %>%
  separate(participant_trial,
           into = c("person_id", "trial"),
           extra = "merge") %>%
  separate(col = trial,
           into = c("metric", "trial"),
           sep = "_",
           extra = "merge") %>%
  mutate(metric = case_when(metric == "c" ~ "creativity",
                             metric == "o" ~ "originality",
                             metric == "u" ~ "usefulness")) %>%
  distinct(person_id, submitter_id)

crowdworker_eval <- crowdworkers %>%
  filter(DistributionChannel=="anonymous")

crowdworker_passed_attn_check <- crowdworker_eval %>%
  filter(attn_check == "4" & attn_check_4_TEXT == "8")
```

```

# Ensure there is a column for the ID of the pilot participant that the submitted idea came from
crowdworker_eval_long <- crowdworker_passed_attn_check %>%
  pivot_longer(cols = 14:2038,
               names_to = "participant_trial",
               values_to = "rating") %>%
  drop_na(rating) %>%
  separate(col = participant_trial,
           into = c("person_id", "trial"),
           sep = "_",
           extra = "merge") %>%
  mutate(rating = as.numeric(rating)) %>%
  separate(col = trial,
           into = c("metric", "trial"),
           sep = "_",
           extra = "merge") %>%
  mutate(metric = case_when(metric == "c" ~ "creativity",
                             metric == "o" ~ "originality",
                             metric == "u" ~ "usefulness")) %>%
  unite(col="participant_rating_id", ResponseId, metric, trial, remove = FALSE) %>%
  mutate(trial_id = str_remove(participant_rating_id, "_creativity|_originality|_usefulness"))
  pivot_wider(id_cols=c(trial_id, person_id),
              names_from = "metric",
              values_from = "rating")

crowdworkers_submitters <- left_join(crowdworker_eval_long, submitter_ids, by = "person_id")
  extract(trial_id,
          into = c("crowdworker_id", "trial"),
          regex = "(R_[A-Za-z0-9]+)_(.*)")

# Merge with trial data from the pilot
# participantID refers to the CloudResearch ID of the idea submitter

trial_data_renamed <- trial_data %>%
  rename(submitter_id = "ResponseId") %>%
  mutate(trial = str_remove(trial, "^[^_]*_")) %>%
  select(submitter_id, condition, trial, object, use, participantId)

crowdworkers_submitters_ideas <- full_join(crowdworkers_submitters, trial_data_renamed, by=c

# Descriptives of overall creativity, originality, and usefulness by condition
crowdworkers_submitters_ideas %>%

```

```
group_by(condition) %>%
get_summary_stats(c(creativity, originality, usefulness),
                  type="mean_sd") %>%
arrange(variable)
```

condition	variable	n	mean	sd
Control	creativity	450	2.49	1.14
Passenger	creativity	570	2.83	1.17
Pilot	creativity	465	2.78	1.25
Control	originality	450	2.46	1.25
Passenger	originality	570	2.73	1.27
Pilot	originality	465	2.73	1.38
Control	usefulness	450	3.00	1.31
Passenger	usefulness	570	3.11	1.25
Pilot	usefulness	465	3.15	1.29

Compensate bonuses for those whose ideas were rated as greater than 3 out of 5 on the creativity scales

7 out of the 45 pilot study participants met the criteria for a bonus.

```
bonuses <- crowdworkers_submitters_ideas %>%
  group_by(participantId) %>%
  get_summary_stats(c(creativity, originality, usefulness),
                  type="mean_sd") %>%
  pivot_wider(id_cols = "participantId",
              names_from = "variable",
              values_from = "mean") %>%
  filter(originality > 3 & usefulness > 3) %>%
  select(-c(creativity, originality, usefulness)) %>%
  rename("Participant or Assignment" = participantId) %>%
  mutate(Amount = 1.00,
         Message = "Great job! Your ideas scored high on creativity, so you receive a bonus.")

write_csv(bonuses, "data/pilot_bonus.csv")
```

```
crowdworkers_submitters_ideas %>%
  pivot_longer(cols=c(creativity, originality, usefulness),
              names_to = "metric",
```

```

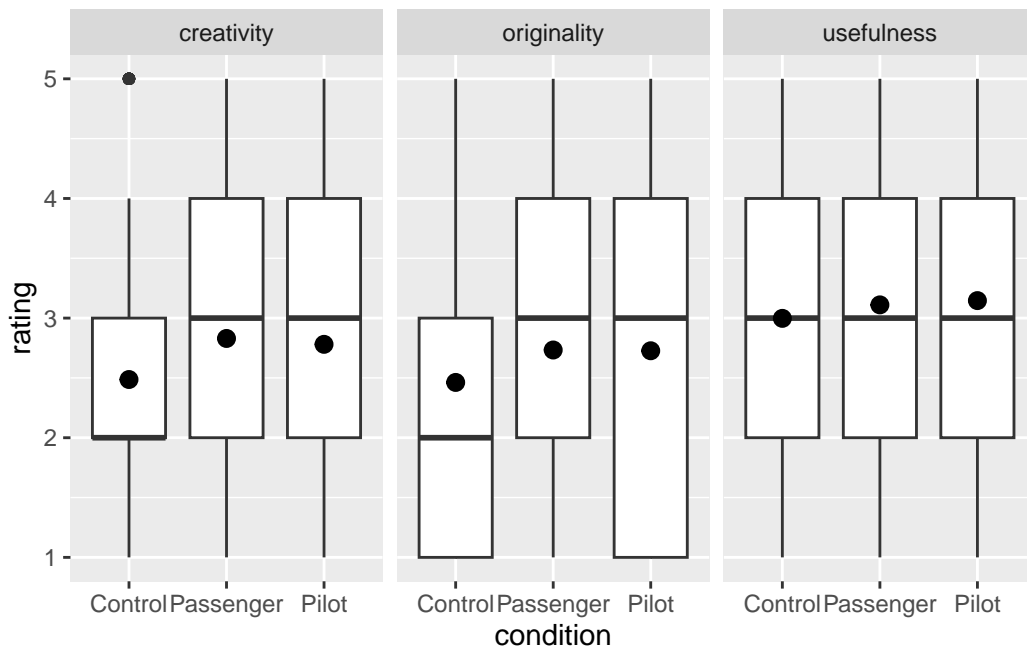
      values_to = "rating") %>%
ggplot(aes(x=condition, y=rating)) +
geom_boxplot() +
stat_summary(fun="mean") +
facet_wrap(~metric)

```

Warning: Removed 3 rows containing missing values or values outside the scale range (``geom_segment()``).

Removed 3 rows containing missing values or values outside the scale range (``geom_segment()``).

Removed 3 rows containing missing values or values outside the scale range (``geom_segment()``).

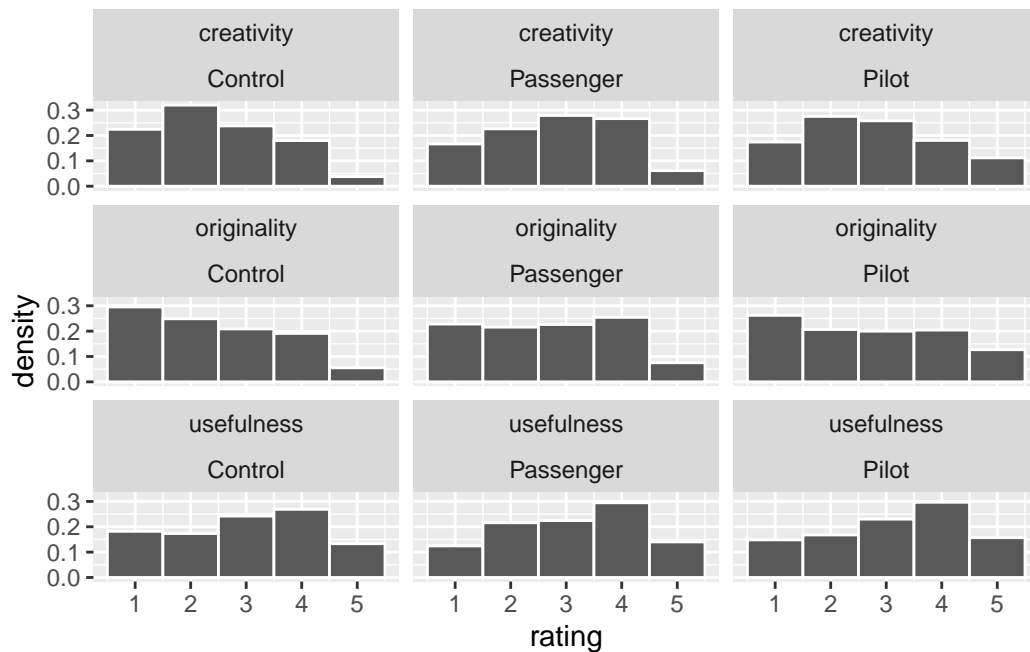


```

# Distributions of ratings for each condition
crowdworkers_submitters_ideas %>%
  pivot_longer(cols=c(creativity, originality, usefulness),
               names_to = "metric",
               values_to = "rating") %>%
ggplot(aes(x=rating)) +
geom_histogram(bins=5,
               color="white",

```

```
aes(y=after_stat(density))) +
facet_wrap(~metric+condition)
```



```
# For each pair of submitter_id and crowdworker_id we can compute mean ratings
crowdworkers_submitters_ideas %>%
  group_by(submitter_id, crowdworker_id) %>%
  summarize(mean_creativity = mean(creativity),
             mean_originality = mean(originality),
             mean_usefulness = mean(usefulness)) %>%
  group_by(submitter_id) %>%
  mutate(rater_num = row_number()) %>%
  ungroup()
```

`summarise()` has grouped output by 'submitter_id'. You can override using the `.groups` argument.

submitter_id	crowdworker_id	mean_creativity	mean_originality	mean_usefulness	rater_num
R_1411N6FExNfRq167	K61PZgvHfWODkt6P	1.87	1.87	2.20	1
R_1411N6FExNfRq167	K67qdtFhoIdAnDN87	3.07	2.80	3.27	2
R_18ED2sNA80e2F87	2F87DkxTyl8G2s0zl1	2.60	1.60	3.07	1

submitter_id	crowdworker_id	mean_creativity	mean_originality	mean_usefulness	water_num
R_1YWjorqdFFa8L1MF	Op8bvegpY2XJ	1.93	2.20	2.67	1
R_1dt5a6hlz1F7uCA3i4oj	MW0Hzczma8	3.33	3.20	3.20	1
R_1dt5a6hlz1F7uCA5nUz3U6jH56vv1a		2.27	2.60	2.53	2
R_1eTQlcB7aeNwR6APTg	VN2jz0q4Vz	3.07	2.73	3.20	1
R_1eTQlcB7aeNwR6Cpqa	WzlsUXkmM	3.53	3.53	3.93	2
R_1eTQlcB7aeNwR6Ub9	GLVG4GgpLH	3.93	4.07	3.53	3
R_1oteCHlseklxInRL6TFbxo	RXNPdost7	1.67	1.87	2.27	1
R_1oteCHlseklxInRL6kla5k58jj	SFUxX	2.47	2.40	2.93	2
R_1oteCHlseklxInRL7Q5tEqy	VMdK6D63	2.67	2.40	3.47	3
R_1ozr7aukaV3YBM5aTYz7dqjkt	FBG9	2.80	3.47	2.93	1
R_1ozr7aukaV3YBM7TGaREcDZz	GshOa	2.80	2.87	3.13	2
R_1ozr7aukaV3YBM7etoEAHa9Ih4aos		2.53	1.80	2.80	3
R_1tljMdjlRs90ORW5uBZyWxpQTdez	Xn	2.53	2.67	3.67	1
R_1tljMdjlRs90ORW61B2xottpw	X5200	2.87	2.60	3.60	2
R_32in84umwhUR7B3F0FbWuLWDtis	Eh	2.47	2.60	2.33	1
R_32in84umwhUR7B3azbOr	AXS6LIb0H	1.73	1.87	2.40	2
R_3EB0Ub0QOnAqBRHlyEmpWLxPW5L		2.27	2.07	2.73	1
R_3EB0Ub0QOnAqBRQLGOjuYE21JA		3.00	2.73	3.00	2
R_3EB0Ub0QOnAqLBSHo5YloYowiCq		2.93	2.40	3.67	3
R_51GSxWAcWIR6B3YZX3HVurobDlebz		4.47	4.67	4.67	1
R_562RAuROCMNWEEDQWVPpwPACWRgd		2.33	2.00	3.07	1
R_562RAuROCMNWEEDQJG7wUp1b6AF		2.13	1.93	2.13	2
R_57Cpskt9eGl7dm1VvDzVicpUXOO0w		3.13	3.07	3.40	1
R_57Cpskt9eGl7dm3ZlcQ1e6Km2ULLi		3.00	2.80	3.27	2
R_5KU53SUL5HPRN3XA6ygccmEV8t		1.73	1.33	1.00	1
R_5LMGJvzFoNfOP6QyFZTMWQguVk4G		3.47	2.13	4.00	1
R_5ZDHxpbRAeQ26ladiE5Zx1ScngzPX		3.60	3.80	4.00	1
R_5ZDHxpbRAeQ26laphSq0cCkDmpemB		3.00	2.93	2.93	2
R_5bPLglkWjL8uRlq3gE7C7Dfh9mDsul		2.87	2.47	3.47	1
R_5bPLglkWjL8uRlq7MDm9op4sms3neR		2.53	2.67	2.73	2
R_5bPLglkWjL8uRlq7Sq6y7bwTd3IkL1		2.40	1.93	2.80	3
R_5chnZzNiBnjQRH5gYGlszcib8uzGF		3.27	2.60	3.67	1
R_5chnZzNiBnjQRH7phDARn2QQ8ijye		2.60	2.67	3.80	2
R_5chnZzNiBnjQRH7q4aiuKwyPteGkv		1.53	1.33	2.60	3
R_5e6zrqGhiIIsnEB3rvsxbCFYB5GI6H		2.07	2.00	2.40	1
R_5e6zrqGhiIIsnEB5A100ZuBjnfjUgq		2.67	2.60	3.33	2
R_5e6zrqGhiIIsnEB765RNFsQwWOgXya		4.40	4.27	3.93	3
R_5nJRT8fXVwtR583NogK7joMIMTI0V		2.33	2.93	3.00	1
R_5nJRT8fXVwtR583OGN9J36JRux8KV		2.67	2.73	3.00	2
R_5nJRT8fXVwtR5852Eburznn02x5lN		2.67	2.60	2.47	3
R_5qgfMHudp9WR1CSb1nsWUoiYDjr		3.60	3.13	4.27	1

submitter_id	crowdworker_id	mean_creativity	mean_originality	mean_usefulness	water_num
R_5qgfMHudp9Wsl30	Wsl30	3.20	3.00	3.20	2
R_5qgfMHudp9Wsl60	Wsl60	2.60	3.00	3.27	3
R_5rdO0N4dLLpBM7W4	BM7W4	3.00	2.33	2.93	1
R_5uW1UlcHUErBb7XC	Bb7XC	1.80	1.93	2.60	1
R_5uW1UlcHUErBb7mZ	Bb7mZ	2.33	2.27	3.47	2
R_5xAXRcsLw4sRwN3	RwN3	2.60	2.47	2.87	1
R_5zr27yYlRtT1gROG	ROG	2.07	1.67	2.60	1
R_5zr27yYlRtT1gROG	ROG	2.13	2.60	2.40	2
R_5zr27yYlRtT1gROG	ROG	1.60	1.60	3.53	3
R_6497Kh9xtoPgBa3w	Ba3w	3.07	3.33	2.60	1
R_6497Kh9xtoPgBa62	Ba62	3.13	3.27	3.33	2
R_6497Kh9xtoPgBa7v	Ba7v	2.20	2.20	3.13	3
R_6JaQ7b7ZPRHeYWLk	HeYWLk	2.80	2.87	3.53	1
R_6JaQ7b7ZPRHeYWLk	HeYWLk	2.60	2.73	3.20	2
R_6NCWvbqWJbhyKXG	bhyKXG	2.13	2.20	3.60	1
R_6NCWvbqWJbhyKXG	bhyKXG	1.67	2.00	3.13	2
R_6YroXZZWq3Agg3m	Agg3m	2.60	2.60	2.80	1
R_6YroXZZWq3Agg7B	Agg7B	3.93	4.13	3.93	2
R_6YroXZZWq3Agg7m	Agg7m	3.67	3.73	3.93	3
R_6pHJdxNTIMrH1Lk	rH1Lk	2.80	2.40	3.67	1
R_6pHJdxNTIMrH1Lk	rH1Lk	2.93	2.80	4.40	2
R_6sSfyaf0EaNqWY3g	WY3g	3.13	2.87	2.60	1
R_6v1ESvZwaI2pR7H	R7H	2.20	1.87	2.00	1
R_6v1ESvZwaI2pR7H	R7H	3.13	3.20	3.20	2
R_6v1ESvZwaI2pR7H	R7H	1.40	1.67	1.67	3
R_6wowreFCXpH1B37	H1B37	2.00	1.47	2.60	1
R_6wowreFCXpH1B3R	H1B3R	3.73	4.00	3.93	2
R_6yDOWJWHeKX8id	KX8id	1.53	1.87	2.00	1
R_73eCbepstplergl_3	gl_3	2.07	2.60	2.93	1
R_73eCbepstplergl_3	gl_3	4.00	4.00	4.00	2
R_73eCbepstplergl_5	gl_5	3.07	2.67	2.87	3
R_73eCbepstplergl_7	gl_7	3.20	2.87	2.87	4
R_79gDLr1lhmcB36d	B36d	3.20	2.13	3.53	1
R_79gDLr1lhmcB36c	B36c	2.80	2.73	3.60	2
R_7CNxvWsgOt2Cz4j	2Cz4j	2.33	2.33	3.20	1
R_7CNxvWsgOt2Cz4j	2Cz4j	3.40	3.33	3.07	2
R_7CNxvWsgOt2Cz4j	2Cz4j	2.47	2.60	2.67	3
R_7EE8J7UI3QkH1ZD	H1ZD	2.47	2.60	3.80	1
R_7EE8J7UI3QkH1ZD	H1ZD	1.40	1.93	2.13	2
R_7FetlppEtP8gCtN1	CtN1	3.07	2.60	3.20	1
R_7dyV5ZDZ7VoR1j5	R1j5	3.40	2.53	3.80	1

submitter_id	crowdworker_id	mean_creativity	mean_originality	mean_usefulness	water_num
R_7dyV5ZDZ7VbR1j66kWHYsaOvW0bdO	81j66kWHYsaOvW0bdO	3.80	4.40	4.60	2
R_7kHtB2QvC1xKrw5B4U1aYGAomcNYt	Krw5B4U1aYGAomcNYt	1.73	2.07	3.60	1
R_7kHtB2QvC1xKrw6B2GFs5SuPWjwE	Krw6B2GFs5SuPWjwE	2.20	2.60	3.00	2
R_7oQJfL9jxFoFBxdYulHlsPB8kibku	BxdYulHlsPB8kibku	2.47	2.73	2.80	1
R_7oQJfL9jxFoFBx64IWd1mxRMXi8wB	Bx64IWd1mxRMXi8wB	3.67	3.67	1.73	2
R_7w47wtEbcHPQfPecxJ5DMxC1RpV5	QfPecxJ5DMxC1RpV5	3.60	3.87	3.00	1
R_7w47wtEbcHPQfPmsbG4jDKAYwjJv	QfPmsbG4jDKAYwjJv	1.73	2.13	1.93	2
R_7w47wtEbcHPQfBahpm43pdil5w9A	QfBahpm43pdil5w9A	2.87	2.40	2.87	3
R_7wP9DGTgAIEhQKhcKkXrEm76hBD	EhQKhcKkXrEm76hBD	3.40	3.20	3.93	1
R_7wP9DGTgAIEhQENrrOtNm9f07vJ	EhQENrrOtNm9f07vJ	2.33	2.07	1.87	2
R_7wP9DGTgAIEhQWPnAk81OZSyD	EhQWPnAk81OZSyD	3.00	2.80	3.40	3
R_8fDtf5HPWBqBlqlmd0hKmG8HNYgHn	Blqlmd0hKmG8HNYgHn	1.93	1.87	2.53	1
R_8fDtf5HPWBqBlqBC2Da0cpim70C00	BlqBC2Da0cpim70C00	3.47	3.80	3.80	2
R_8fDtf5HPWBqBlq5dKM501Z8IUL1Ko	Blq5dKM501Z8IUL1Ko	2.47	2.73	2.33	3

```
# What is the relationship between originality and overall creativity? Usefulness and overall
```

```
# Comparison of automated vs. manual originality evaluations
manual_ratings <- crowdworkers_submitters_ideas %>%
  group_by(submitter_id) %>%
  summarize(mean_creativity = mean(creativity),
             mean_originality = mean(originality),
             mean_usefulness = mean(usefulness)) %>%
  rename(manual_originality = "mean_originality")

automated_ratings <- originality_trials %>%
  group_by(ResponseId) %>%
  summarize(originality = mean(originality)) %>%
  rename(submitter_id = "ResponseId",
         automated_originality = "originality")

cor.test(manual_ratings$manual_originality, automated_ratings$automated_originality)
```

Pearson's product-moment correlation

```
data: manual_ratings$manual_originality and automated_ratings$automated_originality
t = 1, df = 43, p-value = 0.3
alternative hypothesis: true correlation is not equal to 0
```

95 percent confidence interval:

-0.148 0.427

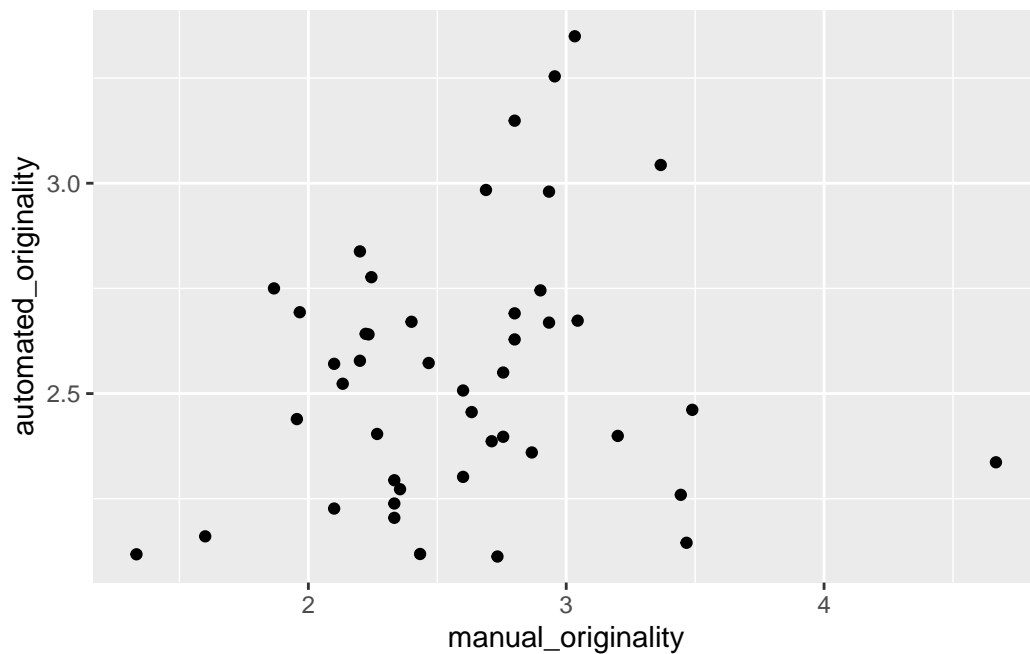
sample estimates:

cor

0.153

```
both_ratings <- full_join(manual_ratings, automated_ratings, by="submitter_id")

ggplot(both_ratings, aes(x=manual_originality, y=automated_originality)) +
  geom_point()
```



Exploratory Next Steps

Chat log data: Actual interactions with AI

We want to compare the interaction behaviors of Passengers and Pilots. We expect that Passengers will copy-paste more than Pilots. Generally, their submitted ideas should look more like what ChatGPT suggested. We can also look at the prompting strategies of Passengers vs. Pilots.

```
chat_log <- read_csv("data/cleaned_user_ai_conversations.csv")
```

```
Rows: 135 Columns: 24
```

```
-- Column specification -----
```

```
Delimiter: ","
```

```
chr (24): participant_id, condition, object, aggregated_ideas, process_open-...
```

```
i Use `spec()` to retrieve the full column specification for this data.
```

```
i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

Process data as a moderator of creative outcomes

We asked participants to report the extent to which they (1) felt they were engaging in dialogue with AI, (2) felt that AI helped augment their creativity, and (3) found the task intrinsically motivating. We might expect, for example, that Pilots produce more diverse ideas *only if* they perceive that AI helped them consider unexpected angles of the object.

Regardless of experimental condition, we might find systematic differences in AI usage when we compare the most vs. least creative participants. How can we characterize those differences?

Power Analysis for Study 2

I ended up doing a simpler GPower analysis.

```
““{# {r, echo=FALSE} # # Create a mixed model and determine random effects from pilot
data # m <- lmer(originality ~ condition + (1|trial), data=originality_trials) # summary(m)
# # # trial variance # rand <- .259 # # # Residual SD # s <- .341^.5
```

```
::: {.cell}
```

```
:::
```

```
```{}
```