• Crafting a RESEARCH QUESTION or HYPOTHESIS

> Identify topic / thesis of question

Research Question — don't use "you", since qn is directed to general audience; MUST NOT be a 'yes' or 'no' qn → start with 'How' or 'Why'

- question → outlines a specific investigation related to the topic
  → inquisitive in nature
  → many possible conclusions may be formed
- often used where little research exists or relationships btwn variables are uncertain.

example: How does radiation affect people's wellbeing in the long term?
(Use "How" or "Why"; topic of qn (be SPECIFIC! look at context); ☆ MUST have question mark!)

HYPOTHESIS

- statement consisting 2 or more variables → predictive in nature
  → definite conclusion is formed
- often used when large body of research exists and relationships btwn variable are certain.

(cx) independent, dependent. (cy)

examples:

☆1) The more hours people spend in exposure with cell phone radiation, the greater their risk of cancer.
(relationship: more; cause: hours people spend in exposure with cell phone radiation; relationship: greater; effect: their risk of cancer.)

2) The wind speed increases as the pressure gradient increases.
(effect: wind speed; relationship: increases as the; cause: pressure gradient increases.)

3) Green roofs and vertical greenery can prevent buildings from heating up.
(cause: Green roofs and vertical greenery; relationship: can prevent; effect: buildings from heating up.)

• PRIMARY and SECONDARY DATA

Primary	Secondary
> data that is collected first-hand	> data that is collected by someone else
how to collect	where to collect (sources)
> responses from close-ended questionnaires conducted by fieldwork researchers → e.g. students	> websites, newspaper articles, journals, maps, books written/produced by other authors.
> interview	
> photographs and sketches taken by fieldwork researchers	

No.:

QUANTITATIVE and QUALITATIVE DATA

Quantitative	Qualitative
> data that can be quantified and measured → can count, numbered	> data is subjective to interviewee.
how to collect	how to collect
> responses from close-ended questionnaire surveys	> conduct semi-structured interviews to find out purpose of an ~~context~~.
> pedestrian count of → be specific on ALL variables (e.g. location)	> conduct open-ended surveys to & to find out purpose of an ~~context~~.
try not > use a frequency scale	> do a field sketch / take photographs to show purpose of an ~~context~~. Annotate them to show aim of qn.
> use a weather tracker to record the temperatures (at diff times of the day). → be specific	

SEQUENCING DATA COLLECTION

> for when both quantitative and qualitative data are needed.

Case 1: Quantitative then Qualitative (numbers (trend) + words (expl. how/why trend occurs?))

1) Quantitative → identify patterns and trends
2) Quantitative → examine patterns and trends observed.

Case 2: Qualitative then Quantitative (words (observe) then numbers (get numerical data))

1) Qualitative → make observations ⊙⊙
2) Quantitative → verify observations (through ranking?) (close-ended qns.)

POSSIBLE LIMITATIONS → study area, data collected, time frame (time available/), logistics, manpower

- study area → access to places
- data collected → how much data to collect?
- time frame → when can collect? / how long to conduct?
- logistics → how many & involved? / available equipment?
- manpower → & involved

Who → Manpower (not enough), How many & involved
Where → study area (access to places)
When → Time available to collect, Duration of study /data collection
What → How much data to collect.
How → available equipment

Limitations → restrictions faced

Risks → possibilities of something bad happening

Manage limitations:
- Bad weather → check forecast (weather) published in news (may have fewer visitors)
  - If light rain expected → students can continue to collect data at sheltered locations at where they are able to interact w visitors w/o getting drenched in rain
  - Bad weather / Not enough time to stand there and collect responses (time constraints) → create an online ver of the close-ended questionnaire survey for & unwilling to participate on the spot due to lack of time
    → generate a QR code for & to scan using mobile phone to access questionnaire at their convenience.

CC

No.:

Look at photograph, relate TB points v to pic.
If cannot then say. Don't have. (be realistic).
MATCH CONTEXT.

① why risk would happen → due to...
② Measure to reduce risk → action

must be considered → ensure mitigation measures are implemented
↳ avoid harming ppl and nature

- RISKS + SOLUTIONS
- Risk of falling / getting injured due to context from qn
  - > take note of potential hazards (e.g. uneven surfaces, steep surfaces, jagged rocks, wet & slippery floor)
  - > wear proper footwear and clothing
  - > bring along a first aid kit
- Traffic accidents due to (collisions with cyclists).
  - > stay on designated path for pedestrians when collecting data
  - X > take note of local traffic hazards and road crossing procedures
  - > be alert and look out for oncoming traffic
- Wildlife encounters → for forested areas
  - > walk away slowly to avoid provoking the animals unintentionally
  - > don't disturb the resident animals (otters)
- Lightning strike / Heavy thunderstorm bad weather ~ → for open and unsheltered areas
  - > check weather forecast / lightning alerts before going out to collect data
  - > find out beforehand where the nearest shelters are and seek shelter in the event of bad weather.
- Pollution
  - > don't litter

No.: Extra → taken from skills cws Q4.

How to sample (collect data.) (usually 1 point (1m) + 1 elab (1m) for each point you come up with)

- Location → locate themselves at the start and end point of the trail / at Tiong Bahru CC.
  elab: ↳ Sheltered, near toilets → opportunity for students to approach visitors easily.

- Method → (See the 3.2 types of samplings + their benefits)
  Eg.

- Frequency/ Timing → collect data for an hour each 3 times a day
  ↳ ensures representation of the visitors sampled within a day

- Sample size → interview at least 30 pax
  ↳ get sufficient data to arrive at a reliable conclusion

Geography EOY Revision ≪Geog in Everyday Life≫ Chapter 3.2 GIEL 3.2

How to collect primary data.

A. Sampling — convenience / quota / simple random / stratified random — +ve
B. close-ended questionnaire surveys — Predefined responses +ve -ve
C. Mental maps — free-form / base — +ve, -ve

rating scales: Likert, Frequency, Ranking

A. SAMPLING
- non-probability sampling
  - ③ convenience
  - ④ quota
- probability sampling
  - ① simple random
  - ② stratified random

① ② ▶ PROBABILITY SAMPLING — used to select a more representative sample

> Samples are randomly selected → no concious decision of researcher

> Using a random number generator or die

↳ removes bias that may come from choices made by the researcher

> Has a greater chance of creating a representative sample (typical of population)

E.g. selecting students from yoursch using a random number generator, instead of selecting only schoolmates you know

① Simple Random Sampling — Students used a random number generator to select the 10 grid □ to collect water samples.

> normally used when little is known about the studied population

How?

- every member of the population is given a number
- a random number generator → generates random numbers (or x-y coordinates) → select the samples

② Stratified Random Sampling — only interview residents above the age of 60 for survey of elder-friendly facilities

> used when the population clearly includes significantly diff. sub-groups.

How?

- Select a sample that has a proportionate makeup to the population based on categories (e.g. age, sex, ethnicity)

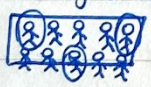
E.g. If 60% males, 40% females → sample follows same ratio

↳ 6 males, 4 females = total sample size of 10.

↓ replicate the general structure of the population

↓ offers a good understanding of the population

* If not randomly (stratified) sampled → quota sampling



Simple Random
Stratified Random
Convenience
Quota.

conducting an exploratory research,
↳ conducting interviews, testing out design of questionnaire
→ used when it is unnecessary or impractical to select a representative sample
→ used when sampling needs to be conducted quickly due to time limitation

NON-PROBABILITY SAMPLING

> Samples are non-randomly selected → uses researcher's concious decision

> Researcher subjectively selects samples — family or close friends

↳ selection may be biased

> Samples unlikely to be representative as they are subjectively selected

↳ hard to make generalisations about the population

E.g. Only select your friends in your class or CCA

③ Convenience Sampling — sending link of online survey to classmates/social media followers

> Samples are selected because they are convenient sources of data

↳ friends and ppl walking down a street - first 100 ppl on a Sat morning.

> carried out in an ad hoc manner — most accessible to the researchers

④ Quota Sampling — interview 5 tourists from diff origins to conduct tourism studies

> select a sample that has a proportionate makeup to the population based on categories (e.g. sex, age, ethnicity)

↳ replicate the general structure of the population

↳ offers good understanding of the population

> samples selected may still be subjective → reduces the representativeness of the data collected

B. CLOSE-ENDED QUESTIONNAIRE SURVEYS

using: ① predefined responses ② rating scales

> investigate the opinions and attitudes of ppl or organisations based on a series of questions

> used to collect quantitative data.

① Predefined Responses in the questionnaire survey

↳ short phrases, single words, numbers (yes/somewhat/no ; less than once a week ; (number) value)

Advantages:

> predefined responses guides participants → easier for them to answer

> researchers may find predefined responses easier to analyse and interpret since they are put into fixed categories

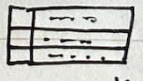
> useful for quantitative data analysis to examine patterns and trends.

(Use specific adj. to describe the feature)

② Using Rating Scales

↳ include a set of predefined responses

↳ often used to guide survey participants to respond to questions on their opinions with a wide range of responses.



please rank your favourite locations in AHS, 1-5 in order of preference. (1 being most preferred).

What do you like about the Zoo? ↳ agreement. vs.

How do you rate the following aspects of Z Zoo? ↳ quality

larger ranking scales → ppl would not have strong opinions abt items ranked in the middle.

- Likert Scale → Scale < agreement (strongly agree, agree, neutral, disagree, strongly disagree) / quality/aspect/feature ↳ rate (Excellent, Avg, Poor, Extremely poor) (Censure both extremes are counted)
- Frequency Scale → no. of occurrences → Not at all / 0-□ times per duration → How often/long do you...
- Ranking Scale → rank items (min 4 max 10) (Less than 10 items → produce reliable data)

C. MENTAL MAPS – used to capture ppl's personal insights about diff places

Provides a lens into:

> how people produce and experience space

> how people think visually and spatially about their environment

> the dynamic interrelationships people have with their environment

•• Collect data using: FREE FORM MENTAL MAPS

> blank papers → asked to draw features in a map form ; including what they know, believe and/or feel about a place/places

Advantage:

- free-form mental maps → more representative of participants' geographic imagination (perceptions of places) of places compared to the use of labelled base maps

Disadvantage:

- not easily georeferenced → not easily mapped onto Geographical Information Systems (GIS) (not easily transferred due to lack of accurate scale)

•• Collect data using: BASE MAPS

> add details by labelling or annotating their perceptions of places on the map

> Open-ended questions → allow 🧍 to give their own responses w/o constraints

↳ able to express their fullest range of views, preferences or emotions

•> Use drawn mental maps as discussion points, semi-structured interviews with open-ended qns can be conducted thereafter

↳ find out more about the 🧍's knowledge, perceptions, preferences and behaviours in places they have experienced

Eg. of open-ended qns:

- Why did you draw a happy face on the futsal courts?
- Is there a reason why you started by drawing your sch in the middle of the map?

↳ understand better the features and labels drawn on the mental maps by diff 🧍.

else see 3.2

GIEL 3.3 Processing and Analysing Data

A. Close-ended questionnaires [Quantitative]

↳ measure frequency — counts ++++ (tally)
— %

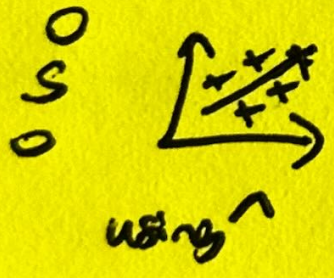
↳ central tendency — mean
— median
— mode
] true, -ve, def, how to calculate

B. Mental maps

drawing vs reality ⇒ how memories represented ⇒ what drawer feels (SOP) — see GIEL 1.2

* Further verification can be made using open-ended qns during a semi-structured interview

C. Relationships & Patterns



& more!

Ch3.3

Date: / /

Geography EOY Revision <<Geog. in Everyday Life>> 4 Sep 2023

Processing and Analysing Data – make meaning of data collected

A. Closed-ended Questionnaire Surveys (Quantitive) (frequency, central tendency)

① Measures of Frequency

Question + Frequency Scale

L cover both extremes

L 4 possible pre-defined responses min.

Using:

> Counts — total no. of times sth occurs

using → tally counting 𝍸 = 5

> Percentage — proportion

using → $\frac{\text{data}}{\text{total data}} \times 100\%$

② Measures of Central Tendency (quantitative)

Mean

def. sum of all values in data set divided by the no. of values in the data set

$\frac{\text{sum of values}}{\text{no. of values}}$

+ve. Includes every value in the data set and no data is left out to show its central location.

-ve. Subjected to the influence of outliers, which can skew it, ∴ not provide the central location

Today's mood:

To unpack tomorrow:

Median

def. Middle value for a set of data that has been arranged in ascending order

① rearrange in ascending order

② take middle mark (odd) — average of middle 2 numbers (even)

+ve. Less affected by skewed/ outliers

-ve. Not as sensitive as mean in showing the central location in a data set.

Mode

def. The most frequent value in a data set

+ve. > Useful for categorical data

(like the diff modes of transport → cars most frequent mode)

> Not affected by outliers.

-ve. Not very useful for continuous data (e.g. temp over a day) because there may be 2 or more values that share the highest frequency.

Date: / /

B. Mental Maps (Qualitative)

↳ verify how well they represent the real world

↳ examine mapper's sense of place (see Ch 2)

How to process?

> analyse how well maps represent reality and how features and labels are drawn or added

> examine how memories of experiences are represented on maps and described during semi-structured interviews.

Aspects of mental maps + Analysis.

- Centering and Borders
  > features drawn at centre → capture attention → signal greater importance to mapper, as compared w those drawn at borders.
  > position of features drawn → follows mapper's perspective
  ↳ may not match reality.
- Scale of map elements - (size)
  > comparison btwn scale of map & reality → provide insights into mapper's familiarity and activity within the space.
  > larger features → may indicate a greater familiarity & more frequent activity there.
  ↳ may not represent reality.
- Labelling.
  > labelled and annotated places → familiarity of mapper
  > content and choice of words (+ve/-ve) used → provide info on mapper's knowledge and emotions of the places experienced.

Today's mood:

- Colours, Legends, Symbols.

memories of experiences represented by these

> colours → differentiate places, convey emotions, (e.g. red → anger)

> legend → explain symbols used

> symbols (♡, ★) (e.g.) → convey personal experiences or information about places

↳ favourite / important location to mapper

- Perspective and Orientation

Perspective

> Aerial view → large area w less details (from above).

> Street view → small area w greater details

Positioning in relation to surroundings — reveals mapper's experiences.

↳ place more impt → depicted as closer to their home.

- Paths, Nodes, Intersections. → roads that meet.

↳ place — place w exchange

added to mental maps → show mapper's personal history of routes often taken (to get to places).

- Blank Space

> unfamiliar to mapper

> no activity

Compare actual maps — analyse diff / inaccuracies portrayed

↳ key in understanding the factors that influence mapper's perceived space.

> Further verification can be made using open-ended qns asked during a semi-structured interview.

> Also ask why some spaces were prominent and others absent/ignored.

↓↓

understand how mapper made sense of place.

C. Relationships and Patterns. — analysing processed data.

↳ explain & interpret observable patterns and relationships.

① Relationships and patterns from scatter plots and best-fit lines.

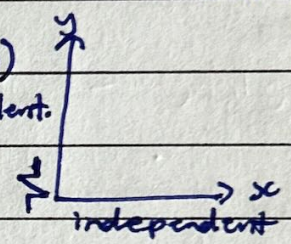
Scatter plot

↳ best-fit line (doesn't need to start from 0)

⇐ ↳ relationships btwn 2 variables

↳ x & y axis always start from 0

Correlation ≠ causation



+ve: x↑, y↑

-ve: x↓ y↑.

> Take evid from points given NOT best-fit line

↳ highest & lowest.

> examine causes of outliers → determine if shld be included in data analysis.

(no correlation)

> No observable pattern → no relationship — no best-fit line

Evid → highest & lowest of x axis, highest & lowest of y axis.

> E.g. At 24°C and 36°C → rice sold stayed more or less the same (data!)

At 24°C and 32°C → no. of rice sold differed vastly date.

② Recognisable geometric shapes, clusters, repetitions.

> Patterns & relationships → emerge by identifying recognisable geometric shapes, clusters, repetitions, analysing sim/diff b/w them.

E.g. > Common approach to find what is common/popular among 🚶: count no. of times each place is labelled/drawn on mental maps

↳ Repetitions or clusters of labellings, geometric shapes or drawn features found in a mental map → indicate popularity and prominence of place.

↳ Absence → indicate unfamiliarity and a lack of interaction within the space.

Geography EOY Revision «Geog. in Everyday Life» Chapter 3.4

GIEL3.4

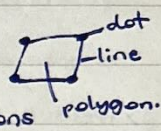
A. Using maps — consists of...
B. Using graphs — bar graph, line graph, pie charts] usage + how to draw + how to interpret
C. photographs and texts — orientations & approaches + benefits
D. Forming conclusions. (reliability, validity — see past. WS

How to present findings

A. USING MAPS

> What?

- visual representation of real-world spatial information (quality) → using symbols



↳ dots, lines, polygons

- discrete features / e.g. tree, shops
- continuous features / e.g. roads
- boundaries / e.g. parks, schools

> Consists of:

- Title
  ↳ detail about map's content → year and data source
- Orientation
  ↳ usually aligned with the compass arrow pointing in North direction.
- Scale (bar)
  ↳ help reader understand map's relative size and distance
- Legends
  ↳ explain symbols used
  ↳ may contain source of data or date the data was collected

(may) consist of:

- author, source(s) of mapping data → shows possible biases
  ↳ allow readers to gauge reliability of info and explore data further if necessary.

B. USING GRAPHS

↳ to interpret data for analysis and present data findings

(↕ ↔)
① bar graph, pie charts] show distribution
② line graphs] show trends & relationships between two variables

> Consider:

- kind of quantitative data
- how graphical presentation can meaningfully communicate findings

① BAR GRAPHS and PIE CHARTS → show frequency distribution (no. of observations within a given interval) in numerical data from fieldwork.

✗ table of total counts → bar graph ✓ (visually clearer, more appropriate for large data range)

✗ table of %s → pie chart ✓ (show proportional usage)

> BAR GRAPHS

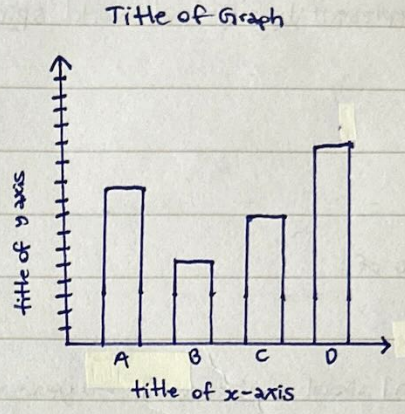
↳ shows total values by categories using rectangular graphs

• Usage:

- present data with discrete/specific categories (e.g. mode of transport → bus, plane, ship)
- compare data between different categories

• Precautions:

- ensure same bar and gap thickness
- ensure same y and x-axis intervals
- include title of graph
- include title of categories (of rectangles)
- include titles of x and y axis.



> PIE CHARTS

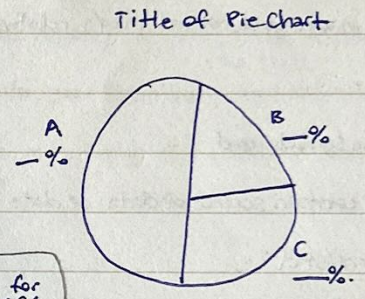
↳ shows categorical data in form of a circular graph.

• Usage:

- show percentage or proportional data

• Precautions:

- add title of pie chart
- add title of categories (of pie segments)
- add percentage of segments
- formula for angle of segments : $\frac{\text{actual value}}{\text{total value}} \times 360°$ for $\frac{\text{actual value}}{\text{total value}} \times 100\%$



• usage :
→ show trends over time

② LINE GRAPHS → present data with continuous variables

• How to show trends and relationships btwn variables :

- upward and downward lines → show increasing or decreasing trends over time
- gradients of best-fit lines (+ve/-ve) → show relationship between variables (sim. to best-fit lines drawn on scatter plots)

C. USING ① PHOTOGRAPHS and ② TEXTS

↳ capture many physical and human features and landscapes → useful in supporting fieldwork findings

① PHOTOGRAPHS — satellite and aerial images → present fieldwork findings w spatial information.

> Processed Satellite Images

E.g. In 2018 → shows spatial distribution of SG's terrestrial ecosystems

↳ by mapping out areas occupied by vegetation and water bodies

> Different Orientations → Offer different perspectives

→ Ground level images → present a detailed part of an area

→ Aerial images → present spatial distribution and patterns over the whole area.

② TEXTS (qualitative data) - present researchers with unique challenges of interpretation & representation

- Including (e.g.):
  - Letters, oral histories, transcripts of interviews, other rich sources of secondary info.
- Common approaches to present findings using text:

① > Colour-coded quotations — analysing & presenting important findings from qualitative data
- help researchers not lose sight of what they are reading when analysing large bodies of texts
- use of colours and its accompanying meanings
  ↳ help to analyse the data and communicate findings

② > Word clouds — present more impt. points in text-based data
- make it easier to recognise most impt points in text-based data
- bigger and bolder the word appears → more it is mentioned within a given text
  ↳ signal greater importance.

↳ whether analysis of data is useful → determine if hypothesis accepted/rejected.

D. Forming Conclusions and evaluating data.

Evaluate data.

Q: Evaluate the validity of findings → Valid/Not valid because : (e.g. Chypothesis) repeat in stem, if needed.

Q: Evaluate the reliability of data collection method. → very Reliable/very Unreliable because

① Scope

don't contradict yourself with same variable. — see WS

② Frequency

③ Physical conditions/limitations

④ Weather conditions

also give both reliable & unreliable, unless specified

⑤ Sampling

⑥ Survey

⑦ Human error (plan B)

* May need to give improvements to ↑ reliability.

Q: Form conclusion

o ① Determine if hypothesis is accepted/rejected → true/not true (valid/not valid) + write out statement (hypothesis) given

E.g. The hypothesis was true/valid. The higher the wave height, the steeper the beach gradient.

s ② Use results/data to support your answer — provide your hypothesis is valid/invalid

↳ use comparative adjectives (highest, lowest) — when comparing diff in data to support stand. + evidence.

o ③ State and give evidence of any anomaly.