Networks of People, Places and Symptoms

A two-day boot camp on social network analysis, qualitative and quantitative

Saturday 31 October and Sunday 1 November 2026

Computational Cognition Laboratory, School of Interwoven Arts and Sciences, Krea University

Convenor	Rakesh Sengupta
Support	Judith Grace Lazarus
Format	Two consecutive days, six contact hours each, no software for participants

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1 Rationale

Social network analysis is usually taught as a software course. Participants learn to produce a picture before they can say what the picture asserts, and the picture is persuasive out of all proportion to the evidence behind it. This camp inverts that. For two days nobody touches a network package. Every quantity is counted by hand on networks small enough to hold in view, and the analytic work is the argument about what should count as a node and what should count as a tie.

The camp carries one substantive claim, stated at the start and returned to at the end. *The same formalism is used for objects with radically different ontologies, and the pictures look identical.* An edge between two Florentine families is a documented marriage. An edge between two Indian Ocean ports is an inference from trade records. An edge between two symptoms in a psychopathology network is a partial correlation estimated from a sample, with a confidence interval usually wide enough to include zero. Participants who leave able to say which kind of edge they are looking at have learned the thing that matters. Participants who leave able to run a layout algorithm have not.

The historical material is not decoration. Treating the Indian Ocean world or a philosophical lineage as a network of knowledge is the cleanest available demonstration that structure is not merely a property of contemporary digital life, and it lets the final session ask whether the clustering produced by present-day platforms is a new phenomenon or an old one at higher speed.

1.1 Design principles

1. **No software for participants.** No installation, no licences, no laptop dependency, no session lost to import errors. The convenor runs one script overnight; that is the only computation in the camp.

2. **Count before you compute.** Every metric introduced is first obtained by hand tally on a graph of at most sixteen nodes.

3. **Five new terms per session, maximum.** Terms go on a printed glossary card that participants keep, and on a board at the front as each one lands. All session material must agree with the card exactly.

4. **Predict, then reveal.** Groups commit in writing on Day 1 to who they think is most central in their own network, and find out on Day 2. Being wrong in public about a network you personally know is the most efficient teaching event available.

5. **Their own data is the spine.** Groups build, by hand, a small network of a world they share. It is collected at the end of Day 1 and returned to them machine-drawn on Day 2 morning.

2 Audience, size and prerequisites

Undergraduates and interested faculty across SIAS, assumed to have no prior exposure to network analysis, no graph theory, and no programming. No mathematics beyond counting is required at any point. Some participants will be uncomfortable with matrices; the adjacency matrix is introduced as a table of ticks, never as an algebraic object.

Target intake 24 to 32, which gives six to eight working groups. The upper bound is set by the convenor's overnight processing capacity and by floor support during hand-work, not by room size. With only two staff on the floor, thirty-two is a hard ceiling.

3 Learning outcomes

By the close, a participant should be able to:

1. State, for any network diagram put in front of them, what the nodes are, what relation the edges assert, and how the boundary of the population was drawn.
2. Construct an adjacency matrix from a verbal description of a small social world, and compute degree, density and path length from it by hand.
3. Explain why two different tie rules over the same population can yield different answers about who is central, and why this is a substantive finding rather than a technical annoyance.
4. Distinguish an observed tie, an inferred tie and an estimated statistical association, and say what each licenses.
5. Identify brokers and structural holes in a small network and give a substantive interpretation appropriate to the domain.
6. Write a one-page network memo specifying population, tie rule, boundary justification and one structural hypothesis, for a problem in their own field.

4 Ethics and consent

Participants generate relational data about each other and about people not in the room. This requires more care than a standard workshop and the care is taught as content, not handled as paperwork.

1. **Relational data cannot be anonymised in the usual way.** A node with distinctive degree is identifiable to anyone who knows the population, even under a pseudonym. This is stated in Session 1 and is the reason for every rule that follows.
2. **Permitted tie content only.** Ties must be non-sensitive and academic in character. The fixed name generator is given in Appendix E and groups may not substitute their own. Prohibited outright: conflict, dislike, romantic or sexual ties, financial ties, health of any kind, and anything bearing on the Day 2 clinical material.
3. **Alters are pseudonymised at source.** People outside the room appear only as `A1`, `A2`, and so on. The key sheet linking pseudonyms to names never leaves the group and is destroyed before submission. The convenor receives pseudonyms only.
4. **Participation in the group exercise is voluntary and severable.** Anyone may decline to be a node in their group's network and still do every analytic task. Groups are told this in front of everyone so declining is not conspicuous.
5. **Data is destroyed after the camp.** Submitted sheets and the derived files are deleted within seven days. Say so on the sheet itself.

6. **No self-rating, ever.** On Day 2 the psychopathology material is a demonstration on published data. No participant rates themselves or anyone else on any symptom, item or trait, in earnest or in jest. Assume someone in the room has a personal stake in the material, because someone will.

A single-page consent slip is signed at registration, covering the group exercise and the overnight processing. Check with the Krea IEC whether a workshop exercise of this kind, with no research output and destruction within a week, needs a formal amendment. The likely answer is no, but ask in September, not in late October.

5 Group formation

Groups of three or four, formed in the first thirty minutes and fixed for both days.

The binding constraint: at least two members of every group must already know each other, and must share a nameable social world – a cohort, a hostel floor, a club, a home town school, a project team. Without this the group has nothing to build a network from on Day 1 afternoon, and the whole spine of the camp collapses for them.

Practical handling. Ask at registration who has come with someone they know, and seed each table with one such pair before distributing the unattached. Do not leave this to self-organisation at 14:00, and do not announce the constraint as a rule to be satisfied after the fact – it is easier to build tables around existing pairs than to repair tables that lack them. Keep one group of three deliberately under-filled as a contingency for late arrivals.

A group whose shared world is very small (two people, four alters between them) should be pointed at a cohort or club rather than a friendship circle. Twelve alters is the cap and eight is a comfortable working size.

6 Day 1 — Saturday 31 October 2026: Seeing structure

Time	Session	Content
09:00–09:30	Registration	Consent slips, glossary cards, group formation
09:30–11:00	Session 1	What is a network? Nodes, ties, adjacency matrix by hand
11:00–11:15	Tea	
11:15–13:00	Session 2	What counts as a tie: the Medici, worked two ways
13:00–14:00	Lunch	
14:00–15:45	Session 3	Your own network, built and counted by hand
15:45–16:00	Tea	
16:00–16:30	Consolidation	Glossary review, sealed predictions, data submission

Session 1 (90 min). What is a network?

No software, no data, no history. Vocabulary and one manual skill.

- **0–20.** Opening claim of the camp, stated plainly: three kinds of network over the two days, identical mathematics, different ontologies, and the pictures will look the same. Ask them to hold that as a suspicion rather than accept it.
- **20–45.** Nodes and ties. Directed versus undirected, with examples where the distinction changes the answer (who lends notes to whom, versus who has studied with whom). Ego network versus whole network. The ethics of relational data, delivered here as substance: why a pseudonym does not protect a node with distinctive degree.

- **45–75.** The adjacency matrix, introduced as a table of ticks. Worksheet W1. A verbal description of a seven-person situation is read aloud twice; each participant builds the matrix individually, then compares within the group. Disagreements will be about the tie rule, not about arithmetic, which is the point and should be surfaced rather than resolved quickly.
- **75–90.** Degree by counting rows. Whose row has the most ticks. First encounter with the idea that a number about a person is produced by a decision someone made earlier.

Glossary card additions: node, tie, directed / undirected, adjacency matrix, ego network

Session 2 (105 min). What counts as a tie: the Medici

The central exercise of the camp. Data in Appendix C.

- **0–15.** Fifteenth-century Florence in the barest outline. Sixteen families, an oligarchy, and a question historians actually argued about: how did the Medici come to dominate without obvious advantages of wealth or office.
- **15–50.** Half the groups receive the marriage tie list, half receive marriage plus business. Neither half is told the other exists. Each group builds the adjacency matrix on chart paper and computes degree for all sixteen families.
- **50–70.** Each group writes on a card: which family is most important, and why. Cards are collected and read out. The two halves of the room will have produced different answers from what they were told was the same question.
- **70–95.** Reveal. Two tie rules, one population, different structure. Then the substantive point from Padgett and Ansell: the Medici position looks different depending on which relation you trace, and the historical argument is precisely about which relation was doing the work. Introduce betweenness informally here – not as a formula, but as "how often you sit on the only path between two others" – and have one group trace paths by hand for a single family to feel how laborious it is.
- **95–105.** Boundary. Sixteen families, chosen by Padgett from a much larger city. Who was left out, and what would change.

Glossary card additions: degree, tie rule, boundary, isolate, betweenness (informal)

Session 3 (105 min). Your own network

- **0–15.** Group declares its shared world in one sentence on the submission sheet, and states the boundary rule it will use. Convenor and support circulate and approve each one before any data is collected. Reject anything sensitive, anything unbounded, anything with more than twelve alters.
- **15–50.** Name generation using the fixed question in Appendix E. Pseudonym key built on a separate sheet held by the group. Alters listed as `A1`–`A12`.
- **50–80.** Adjacency matrix by hand, then degree for every node, then density using the formula on the glossary card. Symmetrise disagreements by the rule they choose, and record which rule they chose – groups will discover that two members disagree about whether a tie exists, and how they resolve it is data about their method, not an error.
- **80–105.** Sealed prediction. Each group writes on a card, and seals it: who is the most connected node, who is the broker whose removal would break the network into pieces, and roughly how dense they expect the network to be. Cards held by the convenor until Day 2.

Glossary card additions: alter, name generator, symmetrisation, density, reciprocated tie

Consolidation (30 min)

Read the glossary board back. Participants explain three terms each to their group without notes. Submission sheets collected, pseudonym keys destroyed in front of the room. Confirm to everyone what the convenor is taking away and what they are not.

7 Overnight processing

The only computation in the camp, done by the convenor between roughly 17:00 and 21:00 on the Saturday. Script in Appendix F.

1. Key each group's node and edge tables into one CSV pair per group. Eight groups at twelve nodes is around thirty minutes of typing. Judith reads out, convenor types, one pass, then a second pass checking edge counts against the group's own hand tally written on the sheet.
2. Run the script. It produces, per group: a laid-out drawing with nodes sized by degree, a second drawing with nodes sized by betweenness, and a one-line metrics summary (order, size, density, mean degree, number of components, highest-degree node, highest-betweenness node, any cut vertices).
3. Assemble into a single slide sequence, two slides per group, plus one combined table for the whole room.
4. **Check each drawing before it goes on a slide.** A group whose network is a star or a complete graph will get a boring picture and should be given a follow-up question instead of an apology – ask them what boundary decision produced the star.

Contingency: if the script fails or the evening runs out, Day 2 Session 4 can be run on chart paper alone, with groups exchanging matrices and computing each other's metrics. Have this fallback written and ready rather than improvised.

8 Day 2 — Sunday 1 November 2026: Same mathematics, different worlds

Time	Session	Content
09:30–11:00	Session 4	Your networks, machine-drawn; predictions opened
11:00–11:15	Tea	
11:15–13:00	Session 5	History as a network: the Indian Ocean, and Collins
13:00–14:00	Lunch	
14:00–15:45	Session 6	Horizons, and a different kind of node
15:45–16:00	Tea	
16:00–17:00	Close	Memo workshop, presentations, what we did not teach

Session 4 (90 min). Your networks, machine-drawn

- **0–30.** Group by group, two slides each, ninety seconds. Sealed prediction opened and read aloud by the group before their slide appears.
- **30–55.** Where predictions failed, and why. The reliable failure is betweenness: people are good at guessing who is popular and bad at guessing who is structurally load-bearing, because brokerage is invisible from inside. This is the single best teaching moment in the camp and it should be given room.
- **55–80.** Attack the boundary. Every group's interesting tie points outside the room, and every group's most connected node is partly an artefact of where they stopped asking. Have each group name one person they excluded and state what would change if that person were added.

- **80–90.** Bridges, brokers, structural holes, defined now that they have seen instances of them in a network they know personally.

Glossary card additions: path, bridge, broker, structural hole, cut vertex

Session 5 (105 min). History as a network

Data in Appendix D. This is the second hand-work session and it consolidates the counting skill on unfamiliar, non-personal material.

- **0–15.** The Indian Ocean world before 1500 as a working system: monsoon cycles, port polities, credit, and the circulation of scholars and jurists alongside goods. Emphasise that this is a network with no centre and no sovereign, which is exactly why the network description earns its keep.
- **15–55.** Groups receive the port edge list. Degree by hand. Then the question that carries the session: *remove one port and the system breaks into pieces – which one?* They find cut vertices by trial, which is slow and should be. Brokerage emerges from the data rather than being defined at them.
- **55–75.** Where did these edges come from? A trade route in a modern dataset is an inference from customs records, travellers' accounts, ceramics finds and later reconstruction. It is not an observed relation in the sense a marriage record is. Introduce the teaching dataset's own status honestly: it is stylised for the exercise, not research data. This is the first of the two ontology shifts.
- **75–105.** Collins on intellectual networks. Chains of teachers and students, the law of small numbers, positions generated by structural rivalry rather than expressing prior conviction. Precomputed lineage graph, no hands-on. Leave them with the uncomfortable version: if positions are structurally produced, what is an author. Do not resolve it.

Glossary card additions: component, path length, cluster, cut vertex (applied), inferred tie

Session 6 (105 min). Horizons, and a different kind of node

The intellectual payload. No hand-work; this session is argument and demonstration.

- **0–25.** Horizons of understanding as the bridge from Session 5 to Session 6. A horizon is what your position permits you to see. Brokers span horizons and pay for it in belonging; closure locks a horizon and makes it feel like the world. Read the Indian Ocean and Collins material back through this, then ask whether present-day platform clustering is a new kind of thing or an old one at higher speed, with lower cost of closure and lower cost of exit.
- **25–55. The third ontology.** Psychopathology symptom networks, as a guided demonstration on published data with precomputed output. Nodes are symptoms, not people. An edge is a partial correlation estimated from a sample: an association between two items after conditioning on the rest, not a relation in the world. Put a Medici picture and a symptom picture side by side and note that nothing in the image tells you which is which. Then show a bootstrapped confidence interval plot beside the pretty graph, and be honest that edge weights at typical clinical sample sizes are unstable and that centrality has a poor record as a treatment-target heuristic.
- **55–85.** Personality disorder as the case where the three levels meet. The interpersonal turn in current diagnostic thinking makes PD partly a claim about a person's relational world rather than about traits alone, so an interpersonal network is not merely an illustration of it. Then the

speculative extension, and label it clearly as speculation rather than settled: whether rigidity of interpersonal schema can be read as horizon-lock – a failure to revise prejudgment through encounter – and whether that is the same structure as network closure or merely resembles it. Invite disagreement and mean it.

- **85–105.** The three ontologies laid out together: observed tie, inferred tie, estimated association. What each licenses, what each does not. This slide is the answer to the camp's opening claim and should be the one they photograph.

Glossary card additions: node ontology, partial correlation edge, estimated association, horizon, closure

Close (60 min). Memo workshop

- **0–30.** Each participant drafts the one-page memo, individually, on paper: a population from their own field, the tie rule, the boundary rule with a justification, and one structural hypothesis. Convenor and support circulate.
- **30–50.** Five volunteers present for four minutes each. The useful feedback is almost always about the boundary.
- **50–60.** What we did not teach, named as a door rather than a gap: inferential models for network data, networks that change over time, and every piece of software. Point them at the follow-up reading and at the lab.

9 Team and roles

Two staff, which is thin. The design compensates by removing software, but it means Sessions 2, 3 and 5 need both people continuously on the floor and neither person can be preparing the next thing while the current thing runs.

Rakesh Sengupta	All teaching. Overnight processing. Holds the sealed prediction cards. Approves every group's declared world in Session 3 before data collection starts.
Judith Grace Lazarus	Floor support in all hand-work sessions, weighted to Sessions 2, 3 and 5. Keeper of the glossary board. Reads out data during overnight keying. Timekeeper, with authority to cut the convenor off, which should be stated to her explicitly in advance and honoured.

Six Beamer decks with speaker-notes versions. The glossary card is the load-bearing document: draft it first and make every deck conform to it, rather than the reverse.

10 Materials

- Glossary card, single A5 sheet, double-sided, one per participant. Appendix A.
- Worksheet W1, blank adjacency grids, four per participant. Appendix B.
- Medici marriage edge list and Medici marriage-plus-business edge list, printed separately and clearly distinguishable only on close reading. Appendix C.
- Indian Ocean port edge list plus an unlabelled sketch map, one per group. Appendix D.
- Group submission sheet, two per group. Appendix E.
- Pseudonym key sheets, marked DESTROY BEFORE SUBMISSION.

- Sealed prediction cards, envelopes.
- Chart paper, markers, a roll of masking tape for the glossary board.
- Consent slips.
- Projector, and a printed set of Day 2 Session 4 slides as fallback.

Per the standing institutional norms: all participant materials digital except the worksheets, cards and edge lists, which must be on paper because the whole camp is hand-work. Tea and biscuits twice daily. Krea students free, external fee set against expected intake. Honorarium at the standing internal rate.

11 Risks

Risk	Mitigation
Groups without an internal acquaintance pair	Seed tables at registration, not at 14:00. Keep one group underfilled for late arrivals. Have two fallback shared worlds ready (the camp itself; a published fictional cast).
Session 3 overruns and submission sheets arrive incomplete	Hard stop at 15:45. An incomplete sheet still runs; the script tolerates isolates and missing attributes.
Overnight keying takes longer than planned	Cap at twelve alters, enforced in Session 3. Two people keying. If it slips past 21:30, drop the betweenness slides and run degree only.
A group's network is trivially structured	Do not apologise. Ask what boundary decision produced it. A star is a finding about the name generator.
Session 6 lands badly for someone with a personal stake	No self-rating, published data only, diagnostically neutral language throughout. Say at the start of the session what is coming, so anyone who wants to step out can.
Date clash	31 October is Rashtriya Ekta Diwas and Diwali falls in early November. Confirm against the Krea academic calendar and against when students start travelling, in September.

12 Preparation timeline

Mid-September	Confirm dates against calendar and travel. IEC query if needed. Draft glossary card.
Late September	Six Beamer decks drafted. Verify the Medici business tie list against Padgett and Ansell (1993) before printing.
Early October	Brochure, lab website page, registration opens. Test the overnight script on synthetic data of the expected shape.
Mid-October	Print run. Dry run of Sessions 2 and 3 with four volunteers, timed.
Week before	Registration closes. Groups pre-seeded from the "came with someone" question on the form.

A Glossary card

Printed A5, double-sided. Nothing may be taught that is not on this card.

Day 1	
node	A thing in the network. A person, a family, a port, a symptom.
tie / edge	A relation between two nodes, as defined by your tie rule.
directed	The tie has a direction. A lends to B is not B lends to A.
undirected	The tie has no direction. A is married to B is B is married to A.
adjacency matrix	A table of nodes against nodes. Tick the cell if a tie exists.
ego network	One node and everyone tied to it.
whole network	Every node in the population and every tie among them.
degree	How many ties a node has. Count the ticks in its row.
tie rule	The stated rule for what counts as a tie. Written down before collecting.
boundary	The rule for who is in the population and who is not.
isolate	A node with degree zero.
alter	Someone named in a network but not present to answer for themselves.
name generator	The exact question used to elicit ties. Its wording is the tie rule.
symmetrisation	The rule used when two people disagree about whether a tie exists.
density	Ties present divided by ties possible. For n nodes undirected, possible $= n(n-1)/2$.
Day 2	
path	A sequence of ties leading from one node to another.
path length	The number of ties in the shortest such sequence.
component	A set of nodes all reachable from each other.
cut vertex	A node whose removal splits the network into more components.
bridge	A tie whose removal splits the network into more components.
broker	A node sitting between others who are not tied to each other.
structural hole	The gap between two groups that a broker spans.
betweenness	How often a node sits on the shortest path between two others.
cluster	A set of nodes more densely tied to each other than to the rest.
observed tie	A relation directly recorded. A marriage register.
inferred tie	A relation reconstructed from indirect evidence. A trade route.
estimated association	A statistical relation computed from a sample. A partial correlation between two symptoms. Has a confidence interval. Is not a relation in the world.
horizon	What your position in a network permits you to see.
closure	A network condition in which a horizon stops being revised.

B Worksheet W1: blank adjacency grid

Four grids per participant, printed with row and column labels blank. Sizes: two grids of 8×8, two of 16×16. Footer on each grid, printed:

> **Before you tick anything, write down:**
> Population (who is in): .....
> Tie rule (what counts as a tie): .....
> Directed or undirected: .....

Row and column headers must be blank. Pre-filling names removes the boundary decision, which is the only part of the exercise that matters.

C Medici data (Session 2)

Sixteen Florentine families, after Padgett and Ansell (1993).

C.1 Marriage ties (given to half the groups). 20 ties, undirected.

Acciaiuoli – Medici	Bischeri – Strozzi	Medici – Salviati
Albizzi – Ginori	Castellani – Peruzzi	Medici – Tornabuoni
Albizzi – Guadagni	Castellani – Strozzi	Pazzi – Salviati
Albizzi – Medici	Guadagni – Lamberteschi	Peruzzi – Strozzi
Barbadori – Castellani	Guadagni – Tornabuoni	Ridolfi – Strozzi
Barbadori – Medici	Medici – Barbadori	Ridolfi – Tornabuoni
Bischeri – Guadagni	Medici – Ridolfi	
Bischeri – Peruzzi		

Pucci appears in the family list and has no marriage tie. Leave Pucci on the sheet; discovering the isolate is part of the exercise.

C.2 Marriage plus business ties (given to the other half)

The same twenty marriage ties above, with the Padgett economic tie list added.

> **Verify before printing.** Reproduce the economic tie list directly from Padgett and Ansell (1993), or from the copy distributed with UCINET or the `networkx` Florentine families data, rather than from any reconstruction. The whole exercise turns on the two lists being genuinely the published ones; an approximate second list makes the reveal a trick rather than a demonstration. Print the two sheets on the same paper stock with the same header, so groups cannot tell at a glance that they have different material.

Expected teaching outcome: on marriage ties the Medici have the highest degree and, more strikingly, much the highest betweenness, sitting between clusters that do not otherwise connect. Under the combined rule the picture shifts and the rival families' position improves. Padgett and Ansell's argument is about exactly this divergence, so the groups will have reproduced, by hand, the shape of a real historiographical dispute.

D Indian Ocean teaching dataset (Session 5)

Status, to be stated to participants: this is a stylised teaching dataset, built for the exercise from general accounts of Indian Ocean trade in the fourteenth and fifteenth centuries. It is not a research dataset and no metric computed from it is a historical finding. Its purpose is to make brokerage visible at a size that can be counted by hand. Abu-Lughod (1989) and Prange (2018) for the substantive picture.

D.1 Nodes (14)

Kilwa, Mombasa, Mogadishu, Aden, Jeddah, Muscat, Hormuz, Cambay, Calicut, Cochin, Colombo, Melaka, Quanzhou, Guangzhou.

D.2 Ties (24, undirected)

Kilwa – Mombasa	Aden – Hormuz	Calicut – Cochin
Kilwa – Mogadishu	Hormuz – Cambay	Cambay – Cochin
Mombasa – Mogadishu	Hormuz – Calicut	Calicut – Colombo
Mogadishu – Aden	Aden – Calicut	Cochin – Colombo
Mombasa – Aden	Aden – Cambay	Colombo – Melaka
Aden – Jeddah	Cambay – Calicut	Calicut – Melaka
Aden – Muscat	Muscat – Cambay	Melaka – Quanzhou
Muscat – Hormuz		Melaka – Guangzhou
		Quanzhou – Guangzhou

D.3 Expected findings

Four regional clusters (East African coast, Red Sea and Gulf, Malabar and Gujarat, the straits and the China coast). There are exactly two cut vertices: Aden, whose removal detaches Jeddah, and Melaka, whose removal detaches the whole China coast. Degrees run Aden 7, Calicut 6, Cambay 5, Hormuz and Melaka 4, most others 2 or 3. The lesson sits in the gap between those two facts: Calicut is the second-busiest port in the network and removing it changes almost nothing, while Melaka has middling degree and removing it severs a quarter of the system. Groups will try Calicut first, because it looks important, and that is the intended surprise.

D.4 Session question set

1. Compute degree for all fourteen ports.
2. Which port has the highest degree? Which single port, if removed, breaks the network into two or more pieces? Are they the same port?
3. Trace the shortest path from Kilwa to Guangzhou. How many ties? Who is on it?
4. Name a pair of ports with no direct tie whose trade must pass through exactly one intermediary. What could that intermediary charge for?
5. Every one of these ties is an inference from indirect evidence. Pick one tie and say what evidence would have to exist for it to be recorded as an observed tie instead.

E Group submission sheet (Session 3)

One sheet per group, two copies issued. Printed on A3 if possible.

E.1 Header block

Group number: ..... Members: .....

Our shared world, in one sentence: .....

Boundary rule (exactly who is in this population, and who is deliberately out): ..

Tie rule (the exact wording of the question we asked): .....

Symmetrisation rule (what we did when two of us disagreed about a tie): .....

Approved by: ..... (convenor initials, required before collecting data)

E.2 Fixed name generator

Groups use this wording and may not substitute their own.

> *Within the world you have just defined, who have you studied with, worked on something with, or asked for academic help from, in the last six months?*

Prohibited: any question about liking, disliking, conflict, romance, money, health, or anything bearing on Sunday's clinical material.

E.3 Node table

ID	Present in room?	Role or attribute (optional, non-sensitive)
A1	Y / N	
A2	Y / N	
… to A12 maximum		

E.4 Edge table

Two columns, `from` and `to`, pseudonyms only. Twenty-four blank rows.

E.5 Footer, printed

Our hand-computed values: nodes _____ ties _____ density _____

The pseudonym key stays with us and is destroyed before this sheet is handed in. This sheet contains no names. Data submitted here is used only for Sunday morning's session and is deleted within seven days of the camp.

F Overnight processing script

Python with `networkx` and `matplotlib`. Reads one node CSV and one edge CSV per group from `data/`, writes two PNGs per group plus a combined metrics table. Test on synthetic data before the camp.

```
#!/usr/bin/env python3
"""Overnight processing for the SNA boot camp, Krea, 31 Oct - 1 Nov 2026.

Expects, for each group G:
    data/gG_nodes.csv columns: id, present, attribute
    data/gG_edges.csv columns: from, to
Writes:
    out/gG_degree.png, out/gG_betweenness.png, out/metrics.csv
"""

import csv
import glob
import os
import re

import matplotlib
matplotlib.use("Agg")
import matplotlib.pyplot as plt
import networkx as nx

OUT = "out"
os.makedirs(OUT, exist_ok=True)


def load_group(tag):
    G = nx.Graph()
    with open(f"data/{tag}_nodes.csv", newline="") as f:
        for row in csv.DictReader(f):
            nid = row["id"].strip()
            if nid:
                G.add_node(nid, attribute=row.get("attribute", "").strip())
    with open(f"data/{tag}_edges.csv", newline="") as f:
        for row in csv.DictReader(f):
            a, b = row["from"].strip(), row["to"].strip()
            if a and b and a != b:
                G.add_edge(a, b) # isolates and typos survive this
    return G


def draw(G, sizes, title, path):
    pos = nx.kamada_kawai_layout(G) if G.number_of_edges() else nx.circular_layout(G)
    lo, hi = min(sizes.values()), max(sizes.values())
    span = (hi - lo) or 1.0
    scaled = [300 + 2200 * (sizes[n] - lo) / span for n in G.nodes()]
    plt.figure(figsize=(7.5, 6))
    nx.draw_networkx_edges(G, pos, width=1.2, alpha=0.55)
    nx.draw_networkx_nodes(G, pos, node_size=scaled, linewidths=0.8,
                           edgecolors="black")
    nx.draw_networkx_labels(G, pos, font_size=9)
    plt.title(title)
    plt.axis("off")
    plt.tight_layout()
    plt.savefig(path, dpi=200)
    plt.close()


def summarise(tag, G):
    n = G.number_of_nodes()
```

```
    deg = dict(G.degree())
    btw = nx.betweenness_centrality(G) if n > 2 else {v: 0.0 for v in G}
    cuts = sorted(nx.articulation_points(G)) if n > 2 else []
    return {
        "group": tag,
        "nodes": n,
        "ties": G.number_of_edges(),
        "density": round(nx.density(G), 3),
        "mean_degree": round(sum(deg.values()) / n, 2) if n else 0,
        "components": nx.number_connected_components(G),
        "isolates": len(list(nx.isolates(G))),
        "top_degree": max(deg, key=deg.get) if deg else "-",
        "top_betweenness": max(btw, key=btw.get) if btw else "-",
        "cut_vertices": " ".join(cuts) if cuts else "none",
    }, deg, btw


def main():
    tags = sorted(
        {re.match(r"data/(g\d+)_", p).group(1)
         for p in glob.glob("data/g*_nodes.csv")},
        key=lambda t: int(t[1:]),
    )
    rows = []
    for tag in tags:
        G = load_group(tag)
        row, deg, btw = summarise(tag, G)
        rows.append(row)
        draw(G, deg, f"{tag.upper()} -- size = degree",
             f"{OUT}/{tag}_degree.png")
        draw(G, btw, f"{tag.upper()} -- size = betweenness",
             f"{OUT}/{tag}_betweenness.png")
        print(row)
    with open(f"{OUT}/metrics.csv", "w", newline="") as f:
        w = csv.DictWriter(f, fieldnames=list(rows[0].keys()))
        w.writeheader()
        w.writerows(rows)


if __name__ == "__main__":
    main()
```

Two deliberate properties. Isolates survive, because a group that produced one should see it. And the layout is deterministic (Kamada–Kawai rather than a seeded spring layout), so the drawing shown on Sunday is reproducible if anyone asks to see it again.

G Reading list for participants

Distributed digitally after the camp, not before. Six items, no more.

- Padgett, J. F. and Ansell, C. K. (1993). Robust action and the rise of the Medici. *American Journal of Sociology*, 98(6).
- Abu-Lughod, J. (1989). *Before European Hegemony: The World System A.D. 1250–1350.* Oxford University Press.
- Prange, S. R. (2018). *Monsoon Islam: Trade and Faith on the Medieval Malabar Coast.* Cambridge University Press.
- Collins, R. (1998). *The Sociology of Philosophies: A Global Theory of Intellectual Change.* Harvard University Press. Introduction and chapter 1 only.

- Borgatti, S. P., Everett, M. G. and Johnson, J. C. *Analyzing Social Networks*. The standard first textbook, for anyone who wants the software the camp withheld.
- Borsboom, D. and Cramer, A. O. J. (2013). Network analysis: an integrative approach to the structure of psychopathology. *Annual Review of Clinical Psychology*, 9. Paired with a paper on the stability of estimated networks, so the enthusiasm and the caution arrive together.

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