ACTISS
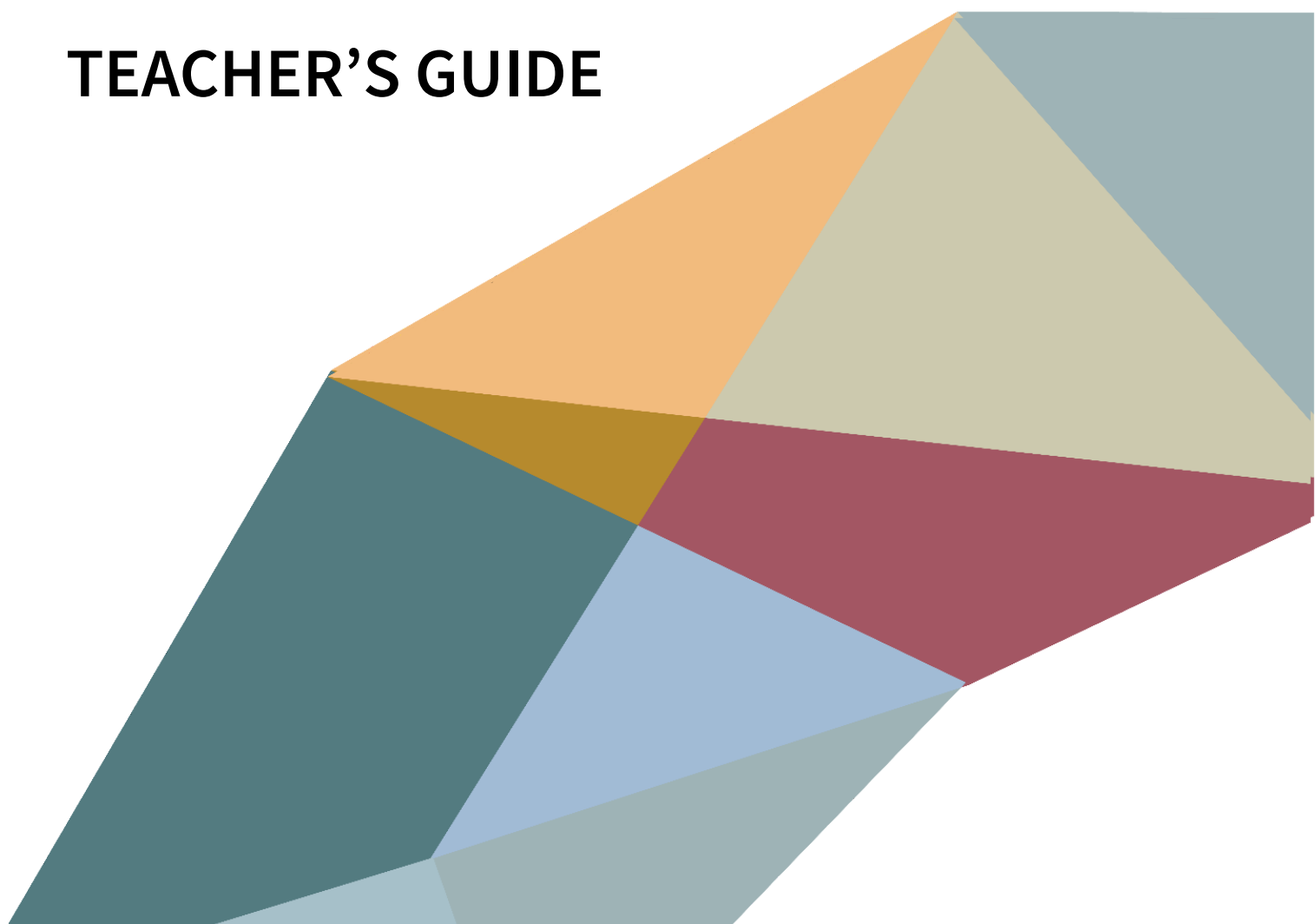ACTION FOR COMPUTATIONAL THINKING
IN SOCIAL SCIENCES

THEMATIC COURSE

Social Network Analysis: The Networks Connecting People

TEACHER'S GUIDE

THEMATIC COURSE

Social Network Analysis:

The Networks Connecting People

TEACHER'S GUIDE

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GENERAL GUIDELINES FOR TEACHERS

Within ACTISS we are creating and producing open online courses that introduce the basics of computational social science. Our interactive courses are made with two types of audiences in mind:

- individual learners who want to study by themselves -> massive open online courses (MOOCs), available for free on Futurelearn platform

- academic teachers who would like to enrich their courses with engaging and easily accessible materials -> materials available at actiss-edu.eu

The materials available on the website are prepared on the basis of our Futurelearn courses but they are designed in such a way that makes it easy to incorporate them in your courses.

ENGAGING AND ACCESSIBLE CONTENT

It is worth noting that all ACTISS courses are designed in such a way that no prior mathematical and programming skills are required from students. The courses can be used as an easy and engaging introduction to more advanced courses.

In all courses within the ACTISS programme we want to provide people who identify as having 'no brain for science' (a fear for computation and formulas) with a very gentle introduction to Computational Social Science, to pen-and-paper formal models and to Agent-Based Models. We want to build up interest in this domain and their confidence in this area. By the end of the course we want the learners to be able to experience how modelling and simulations can help understand social phenomena and to experience how investigating a social phenomenon with the use of an Agent-Based Model works. We also want them to be aware of the potential benefits of using a computational approach to practical situations and be willing to try them out.

HOW TO USE COURSE MATERIALS?

- **We encourage you to use the materials to enrich your courses**. You can download all the materials for the course and use them:
  - as a whole segment (e.g. 12 hours of a 60 hour long seminar)
  - or pick the elements that best suit your needs (e.g. use some videos and exercises as homework for students and then discuss the homework during a meeting).
- Educational materials are divided in weeks (units) and each week consists of a series of appr. 20 small steps:
  - short articles - max.1000 words, usually followed by a discussion prompt,

- short videos - max. 6 minutes (links are included in the text),
- discussion questions,
- exercises (if they relate to models, links are included in the text),
- quizzes (2-6 questions to check student understanding)
- Some steps may be used as a homework assignment (articles, videos, exercises), some can be used within a classroom setting (discussion questions, exercises, quizzes)
- In each course there are some NetLogo models that were designed for the course or adjusted to the needs of the course. A complete list of models is available on the [project's website](#) and also on [project's Github](#).
- Educational materials are downloadable as a set of pdf files, each containing one week's materials preceded by a list of steps and followed by a list of correct answers to all quizzes
- The best way to browse the materials for the course is to first check the Curriculum document and check out the documents for specific weeks/units (especially short description at the beginning of all such documents) or, provided a certain course is available on Futurelearn, to enrol to the course and go through the steps there.
- Additional exercises and educational scenarios are provided at the end of each Teacher's Guide. These are mainly exercises that take longer time to complete or require more teacher's support, or require some group work, or can be used as a basis of a whole lesson/meeting.

GUIDELINES FOR TEACHERS RELATED TO: Social Network Analysis: The Networks Connecting People

In this course we help the learners explore how networks form, and how they impact the spreading of different types of information in society. The learners will get to grips with the basics of social network theory, before considering how different social exchanges impact network structures and dynamics of opinion and product choice. THey'll learn how the way we communicate, and even share viruses, is shaped by social network structures that existed in our tribal history, and have expanded in modern society. Finally, they'll learn how social influences play out in larger networks, as you explore what impact small scale tribal mechanisms, like local norms, have on global network dynamics.

COURSE STRUCTURE

Week 1: Living in communities

Humans are a very social species, and they interact a lot. These interactions may address the exchange of information, the sharing of norms, and the transmission of viruses, to name a few examples. Our network history starts with thousands of generations of hunter gatherers, living in relative small tribes and families. This week we will explore some of the fundamentals of interactions within such networks. Because network dynamics evolve over longer time periods, and involve large numbers of people, it is difficult to experiment with them. Therefore, social scientists increasingly use computer simulations to study the dynamics of social networks. This week you will play with easy to use simulation models to get hands-on experience with the dynamics of networks and key concepts of network theory.

Week 2: The larger agricultural society and hubs

This week deals with the role of "hubs" or "superspreaders" in social networks, and will introduce you to the sharing of information and normative influences that are important in the spreading of e.g. products, ideas and opinions in social networks.

Week 3: Global society and social influences

This week is about the global network and local norms.

ADDITIONAL MATERIALS

The materials below can be used as homework assignments or within a classroom setting. All elements listed below provide materials for a total of. 10-15 hours of workload.

Sequence about communication related to protest organisation

Communication sequence - this sequence relates to the way people communicate about protests and the role of social media in protest organisation.

ARTICLE: The importance of "Going" button

In this article we will discuss how we can learn about the predicted size of the protest in real life and how enabling communication between potential protesters could change the dynamics of the process.
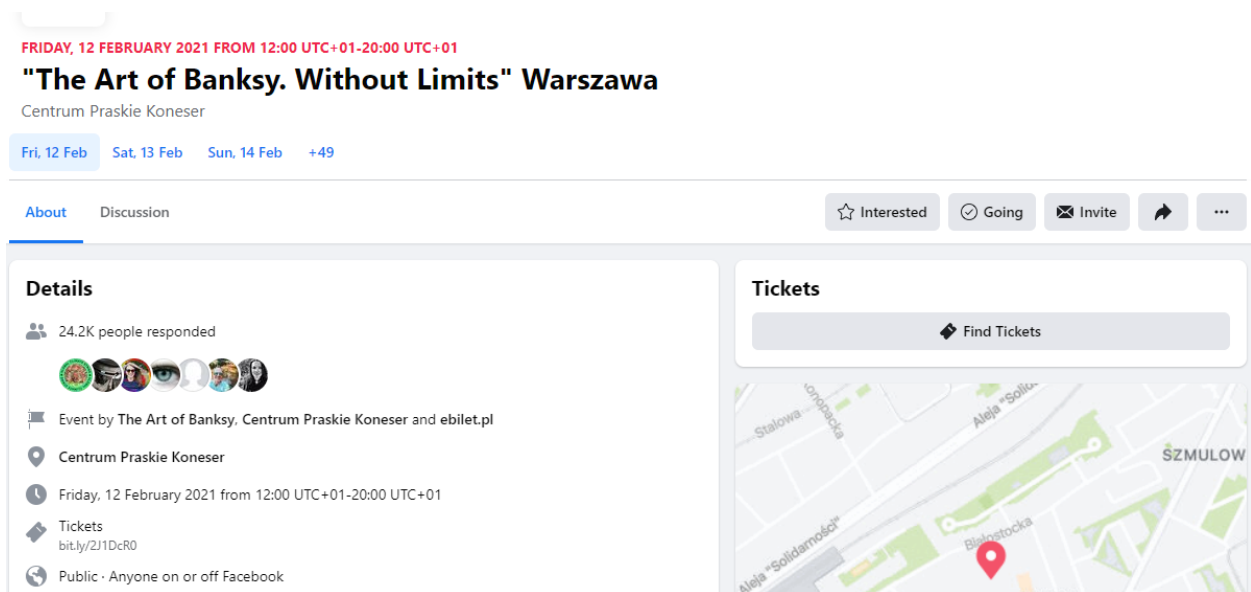

Image: a screenshot from Facebook where we can see how many people are going to an event

This time we will discuss how we can learn about the size of the protests in real life and how enabling communication between potential protesters could change the way they make decisions related to the protest.

In case of real protests (and other social events we attend), if we want to find out how many people we will meet there we usually don't just observe it through our windows and spontaneously join the crowd. First of all, it would actually be quite difficult or impossible even in a small town, no mention of large cities and demonstrations that gather thousands of participants, coming from all over the region or country. If observation were our only means of learning about the size of the protest, it would definitely be difficult to organise any demonstration. And here is where communication comes in handy. Usually, protests are

planned in advance and we may decide whether we want to go long before the planned date of the demonstration. But still, in general the same rule may be operating, namely a rule that states that the more people are going to be there, the more willing we are to be there too. How can we estimate the size of the protest before it happens? Someone who is organising a protest may inform us that she thinks at least a hundred people are going to be there. We can hear from the media that a huge protest is going to take place at the central square of the town on Saturday (although the journalists also had to learn about the size of the protest from some source). But there is one more way that doesn't really require the organisers to centralise the counting process. It requires people to count themselves by announcing to the others that they are going. That would probably be quite difficult fifty years ago but now with all the social platforms and digital networked communication - it's perfectly imaginable.

One of such digital tools that might be very useful here is the "Going" button on the most popular social network apps - Facebook.

So, **how does the "Going" button work?** On Facebook, organisers of a certain protest can create an "Event" where they inform potential participants about the aim, name, place and date of the event. But this is not as important as this one clever feature - people who see the event's site can inform the others about their intentions related to this event - they can click the "Going" button or a less decisive "Interested" button. Those declarations are counted and the numbers of people "Going" and "Interested" in the event are visible to all the people who access the event's website.

The first important power of this feature is that **it helps us estimate the size of the protest** and helps everyone decide whether their threshold is reached or not before the actual demonstration takes place. It simply helps communicate the willingness to go which in turn helps the others to decide whether they want to join the action.

The second feature is that **it can help easily mobilise a much wider group than in case of a very local communication**. In a very simple case, if I'd be willing to go to a demonstration only if I believe at least one thousand people will show up, I'd never go based on my local knowledge about my friends, relatives or neighbours (because there is no chance for me to even know such a huge group). And then again, with a Facebook event there is a chance that I'll see those one thousand clicks and go to the protest.

But there is another interesting issue here. Let's face it - if you're on Facebook, you must have clicked the "Going" button to an event that you're not really going to - just as a sign of approval or interest - or maybe… in order to encourage the others to attend, right? (I have). If so, this little feature could not only help observe real intention to go but something more - a general attitude towards the issue. And the more people click on "Going" or "Interested", the more people expect a bigger group to appear, which may in turn encourage them to go too, creating a positive feedback loop and boosting the numbers.

If you are interested in investigating in detail how people can cooperate in solving problems and how they influence each other - we recommend taking another course from ACTISS project "Are we doomed to destroy our planet?" where you will have a chance to investigate behaviour of people interacting with each other and facing some problems in those interactions, to explore basic game theory and socio-ecological models.

EXERCISE: Fruit County social networking site

In this exercise you will investigate what would happen if the residents of Appleton and other Fruit County villages could announce their intention to go to the protest via a networking site.

We've learnt that one of the powers of "Going" button is that it helps organise the potential for protest. If we look at the whole population, it's much easier to find some initiators and some people with low thresholds - and then a whole avalanche of people announcing that they're "Going".

Let's go back to Fruit County for a second. This time the inhabitants of all the villages use a networking site. One of the initiators (let's say it was Mary from Appleton) started an event that she called "Highway away from the villages of Fruit County '' where she proposed to voice the negative feelings towards the highway plans in front of the County Office at midday the following Sunday. Let's now assume that the information about the event has reached all the inhabitants of Appleton, Berryville, Mangrobrook and Limeborough. Will this help scale up the protest?

The whole population of Fruit County (40 people) is described in the table below:

Appleton	0	1	2	3	3	3	6	7	8	11
Berryville	1	1	3	3	3	3	6	7	8	9
Mangobrook	0	0	0	3	4	5	6	7	8	8
Limeborough	0	2	2	2	3	3	3	3	3	3

How many people will eventually join the protest?

DISCUSSION: What does "Going" really mean (apart from "I'm really going")?

Why do you think people declare "Going" to different events they are not really going to? What is their point? Have you ever done that?

VIDEO + DISCUSSION: The ups and downs of using technology for protest organisation

Watch a talk by Zeynep Tufekci, a sociologist talking about the role that technologies play in organising protests and social movements and how sometimes being able to organise a huge protest doesn't mean that it will help introduce big social changes in the long-run.

[How online social movements translate to offline results](#) - YT

On another occasion Tufekci said:

"And I've come to realize that part of the problem is that today's protests have become a bit like climbing Mt. Everest with the help of 60 Sherpas, and the Internet is our Sherpa."

"Because to succeed over the long term, sometimes you do need tea without sugar along with your Twitter."

In the talk you've seen she says that if you're "going from 0 to 100 miles in just a month or two, you need a better steering wheel than just a Facebook group"

What do you think it means? Do you agree with those words?

EMERGENCE

After the experiments during Week 3 learners can observe patterns emerging without any coordination. This might be an opportunity to introduce the term EMERGENCE and discuss it with students.

ARTICLE: Unexpected patterns

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In this article we will briefly describe what emergence is and how it relates to the patterns we observed in the spatial protest experiments.

As it was already stated the final results we observed often looked like smaller or bigger stains of colour - neighbourhoods with the banners in all houses and the ones where no flag could be seen.

A mixture (for example places where exactly 30% of people would have banners in their houses) were rarely seen. From a bird's eye view it almost looked like somebody organised it - it looked quite orderly, like a neat pattern, not random and chaotic. So, what we've observed in Cherryville were quite nice patterns (colour stains surrounding the initiators, one part of the city purple, the other part grey etc.) but NO ONE has acted consciously to create those patterns. We can see organisation where there was no organisation!

This observation leads us to a term that is quite important when we are dealing with complex processes. This term is **EMERGENCE** and means that some structure or pattern arises during the process of self-organisation. It may sound difficult but it basically means that although none of the citizens of Cherryville wanted it, planned it or instructed his or her neighbours to create such a distinct pattern, it arised and it is visible - because of the actions of individuals.
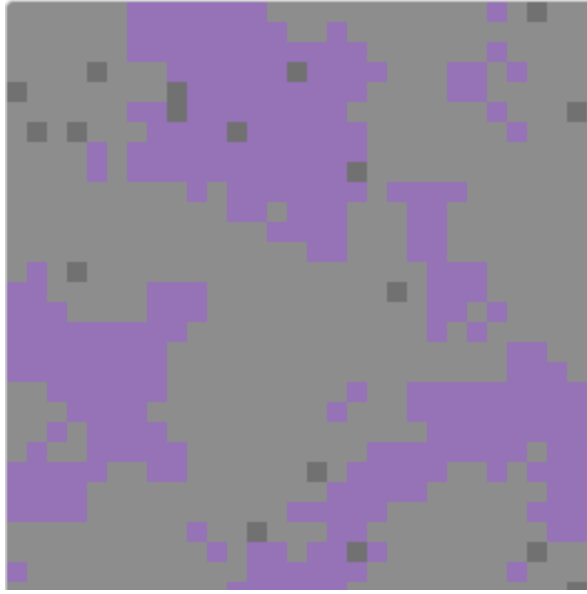
This is **a clear pattern that was created without any top-down coordination - it just emerged.**

And for a contrast, look at other patterns seen from a bird's eye view, this time - orchestrated and coordinated by someone - planned ahead and managed (imagine how long they had to practice before forming such patterns):

https://www.perthnow.com.au/sport/other-sports/thousands-gather-in-hamburg-to-form-giant-olympic-rings-formation-ng-11c5f5c9f2ce9e374f57078c00fbc673

In case of our spatially spread protests we can see a similar result that can be produced by planning, managing and coordinating (e.g. music played by the orchestra, a sign of olympic circles made by dancers and designed by a choreographer, marching bands that create patterns). The only thing is - no one orchestrated them.

Such clear structures and patterns that appear as a result of bottom-up processes are observed both in nature and in social processes. One of the most prominent examples of a pattern emerging without top-down coordination is a process of flocking. And in case of social processes, just think about little boys and girls in a school classroom (at this age where they feel it's inapropriate to fraternise with the opposite sex). Sometimes we can see totally separate groups not because the teacher told them to sit in such groups but because it just happened because of individual decisions.

If you are interested in how flocking emerges ▷ try out a model for flocking in the NetLogo:

http://netlogoweb.org/launch#http://netlogoweb.org/assets/modelslib/Sample%20Models/Biology/Flocking.nlogo

This model is an attempt to mimic the **flocking of birds.** The resulting motion also resembles schools of fish. The flocks that appear in this model are not created or led in any way by special leader birds. Rather, each bird is following exactly the same set of rules, from which flocks emerge.

*place within the course: Week 3

MORE EXPERIMENTS WITH MODELS

Models for this course are available at: https://actiss.github.io/netlogomodels/ in the folder "Introductory module"

Apart from the exercises that are described in Week 3 materials those models can be used as a basis of other experiments.

*place within the course: Week 3

CRITICISING MODELS

DISCUSSION: Neighbours don't act like that!

Developing a model often starts with criticising it. Have you ever taken part in a protest, because you saw your neighbour do it? It is quite rare. What do you think should be improved in the model of a 'spatial' protest to make it more realistic?

*place within the course: Week 3