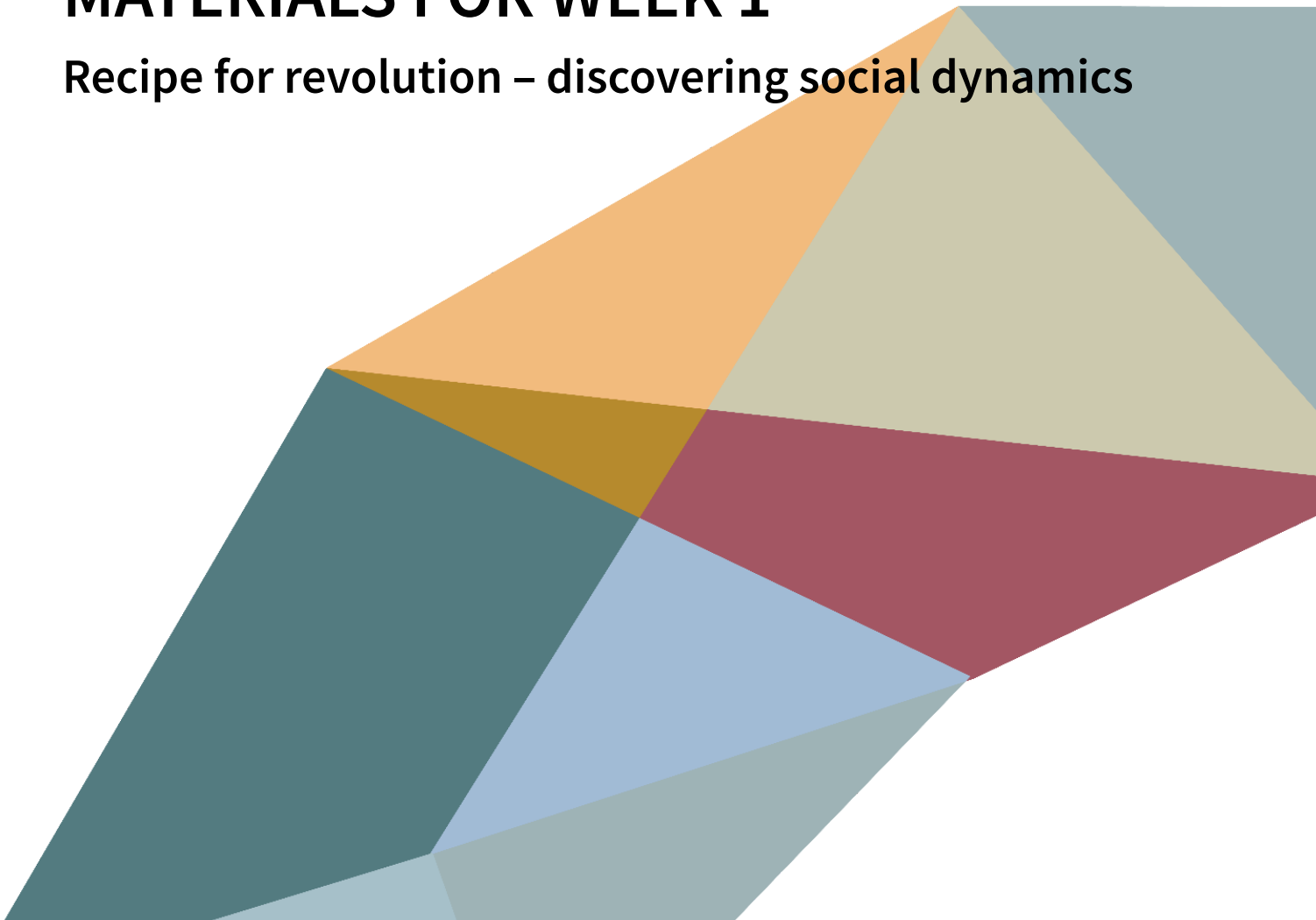**ACTISS**
ACTION FOR COMPUTATIONAL THINKING
IN SOCIAL SCIENCES

INTRODUCTORY COURSE

MATERIALS FOR WEEK 1

Recipe for revolution – discovering social dynamics

INTRODUCTORY COURSE

People, Networks and Neighbours: Understanding Social Dynamics

MATERIALS FOR WEEK 1
Recipe for revolution – discovering social dynamics

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OVERVIEW OF THIS WEEK'S MATERIALS

This week introduces basic concepts of social dynamics, modelling and simulations. It introduces the concepts of: model, modelling and simulations. We start with asking the question about **difficulties** with predicting social behaviour and then we build a simple model of organising a protest (based on a simple threshold model).

Keywords: social dynamics, micro-macro problem, butterfly effect, model, modelling, simulation, computational social science, computational models

STRUCTURE OF THIS WEEK'S MATERIALS

Why are social processes hard to predict?
In this activity, you will consider why social processes seem so unpredictable and have a closer look at one specific process of organising a protest.
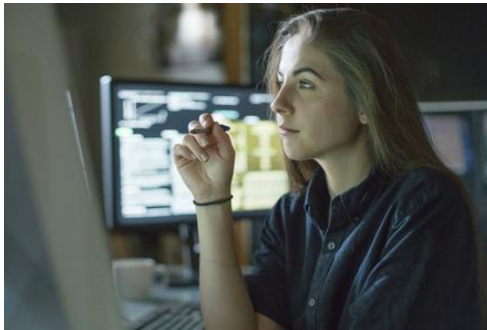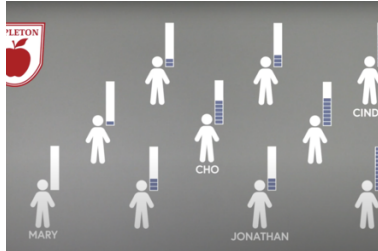

STEPS:

Living in a complex world – <u>VIDEO (03:17)</u>
Introductions – <u>DISCUSSION</u>
How do protests come to life? – <u>VIDEO (04:34)</u>
A complicated social world – <u>ARTICLE</u>

Organising a protest - investigating a simple model
In this activity, you will investigate a very simple model of how a protest comes to life and explore how micro behaviours lead to unexpected outcomes on a social level.

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Understanding the mechanisms behind Fruit County protests – <u>QUIZ</u>

It's not their fault! – <u>ARTICLE</u>

Between micro-behaviours and social outcomes
In this activity, you will explore how a small change can have a big impact on the final outcome and how it is important to think about mechanisms leading from individual behaviours to the results on a societal level.

STEPS:

Making a perfect protest – <u>QUIZ</u>

The Butterfly Effect – <u>ARTICLE</u>

Questions about the Butterfly Effect – <u>QUIZ</u>

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How harmless actions can lead to social problems – <u>DISCUSSION</u>

Model, modelling and simulations
In this activity, you will learn what model, modelling and simulations are - on the basis of your experiences with the protest organisation example.
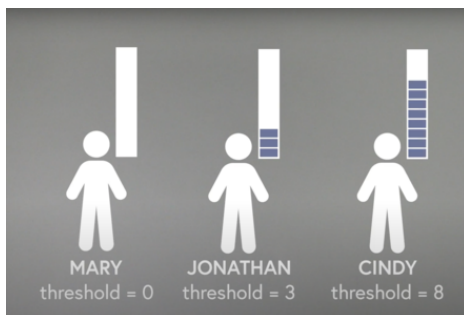
Model, modelling and simulation – <u>ARTICLE</u>

Modelling individuals as crash test dummies – <u>ARTICLE</u>

Universal models – <u>VIDEO (02:38)</u>

Summary
Wrapping up week 1.

EDUCATIONAL MATERIALS

1. Living in a complex world – VIDEO

Click on image to view video
This video is an introduction to the whole course [People, Networks and Neighbours: Understanding Social Dynamics](). The main idea and aims of the course are discussed here.

2. Introductions

In this step the course team is introduced and we invite you to introduce yourselves as well.

TEAM

[Agata Komendant-Brodowska](#), **lead educator**

Hi, my name is Agata Komendant-Brodowska, I'm a sociologist at the University of Warsaw and I'm passionate about using models and simulations in order to understand social processes. I love the way even simple models can help illuminate some important issues related to what happens in our society and I'd like you to experience it during the next three weeks. I'm leading the project "Action for Computational Thinking in Social Sciences" and we created this course as a part of this project.

[Anna Baczko-Dombi](#), **lead educator**

Hi, my name is Anna Baczko-Dombi and I'm a social researcher from the University of Warsaw. I'm leading the Digital Sociology masters programme and I love translating difficult things into easy and understandable ones. In this course we designed the materials in such a way that they are accessible and understandable. I hope you will experience that modelling and simulations are fun and much easier than they might sound.

[Tom Spits](#), **online learning designer**

Hi, I am Tom Spits, online learning design specialist and video-in-education expert at University of Groningen. I specialise in designing Massive Open Online Courses and have co-created all of [University of Groningen's FutureLearn courses](#) since 2014.

The course was co-developed with support from Computational Social Science specialists:

[Wander Jager](#), leader of the follow-up course [Social Network Analysis: The Networks Connecting People](#)

Hi, I'm a social scientist working at the University College Groningen & Faculty of Economics and Business. Also I'm managing the Groningen Center for Social Complexity Studies. Twitter: @GCSCS_RuG

[Katarzyna Abramczuk](#), **co-author of an upcoming course on game theory and socio-ecological models.**

Hi, I'm a social scientist working at the University of Warsaw. I enjoy understanding what is happening and how. Hence my interest in formal modelling. Also, I do research on Human-Technology Interaction.

[Nataliia Sokolovska](#), **technical project manager.**

Hi, my name is Nataliia and I'm a researcher and project manager at the Alexander von Humboldt Institute for Internet and Society in Berlin, where we study digitalisation of society. I'm passionate about finding ways to connect the world of academic research with societal needs with the help of using digital tools. In the project Action for Computational Thinking in Social Sciences, I developed and implemented strategies for transforming analog study materials into an online course.

[Franziska Cagic](#), **video editor and producer.**

Hi, my name is Franzi and I'm a video producer and editor. I enjoy creating visual instruments that explain complex material in an accessible format. In the project Action for Computational Thinking in Social Sciences, I was shooting and editing the course videos, and designing short animations.

We would also like to thank [Gabriela Grzelak](#) for programming the NetLogo exercises.

Online learning design

The course was co-developed with support from educational specialist [Tracy Poelzer](#).

Support

We also thank [Beatrix](#), [David](#), [Frans](#), [Karolina](#) and [Lena](#) for their wonderful support in getting all texts, videos and images to the platform.

ACTISS

This course is a part of ACTiSS - an educational initiative Action for Computational Thinking in Social Sciences, co-funded by Erasmus+. It's aim is to develop engaging and accessible online courses introducing the basics of computational social sciences. The project is carried out by a team of simulation, modelling and open education enthusiasts from three partner institutions: University of Warsaw (leader), University of Groningen and The Alexander von Humboldt Institute for Internet and Society. The project is funded by Erasmus+ KA2: Strategic Partnership in the Field of Higher Education. If you'd like to know more, please check out our [website](#).

University of Warsaw: University of Warsaw is the leading research university and the largest higher education institution in Poland, with a comprehensive portfolio of research and teaching activities.

University of Groningen: The University of Groningen is a research university with a global outlook, deeply rooted in Groningen, in the north of the Netherlands.

Alexander von Humboldt Institute for Internet and Society (HIIG): The HIIG from Berlin is exploring digitalisation together with economic, political and civil society stakeholders.

OVER TO YOU

So, now you know who we are and what you can expect from us. Could you introduce yourselves and maybe share an example of a social phenomenon that you feel is complicated or puzzling and you'd like to understand it better? It could be any social behaviour i.e. behaviour of a group of people, something that is happening locally or something that relates to a whole society. Also have a look at what other learners posted and start learning together.

3. How do protests come to life? – VIDEO

Click on the icon to view the video

In this video Agata Komendant-Brodowska will discuss why social processes seem so unpredictable with the use of an example of demonstrations and how they come to life.

She will also describe several reasons why it is difficult to predict the size of the protest. These include the following circumstances:

- Large numbers of people are involved
- People are complicated (and diverse)
- People influence each other
- Situations changes in time

These are also the reasons for why social processes in general are hard to predict.

4. A complicated social world – ARTICLE
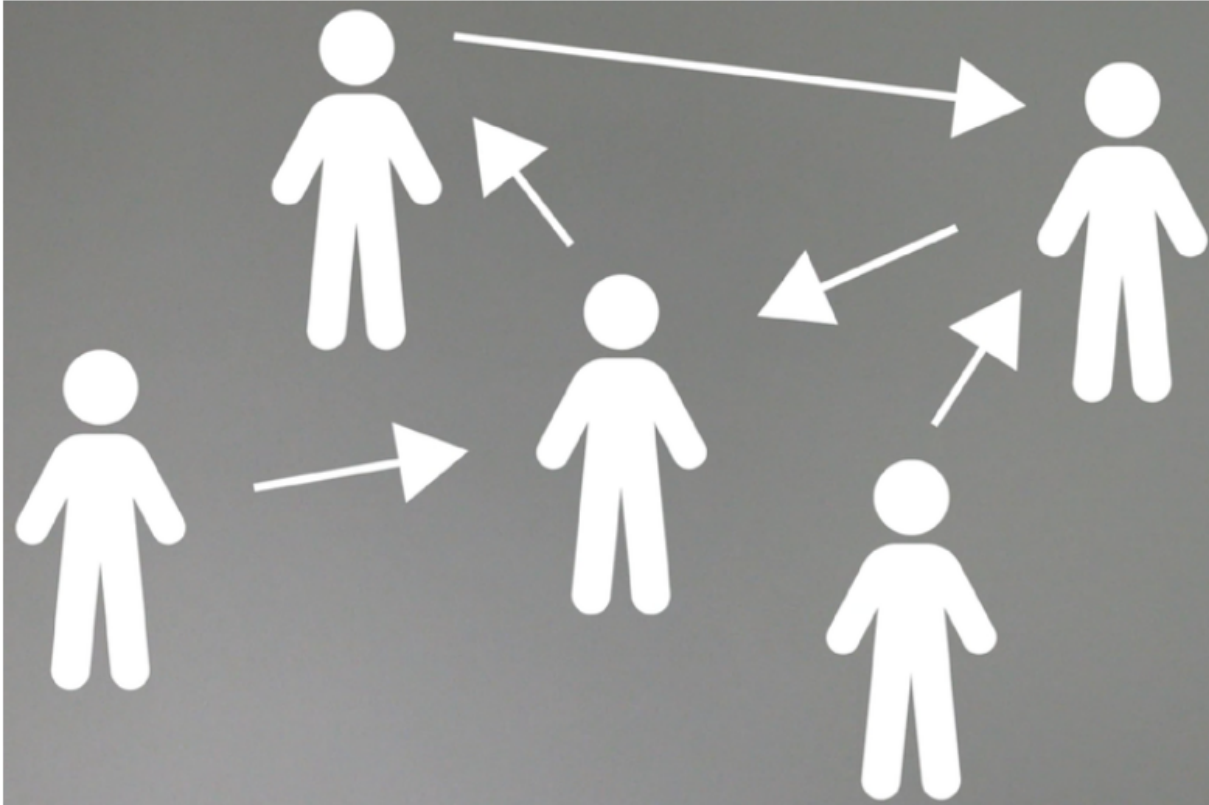
In this article we will list the main challenges related to studying social behaviour and examine them in an example related to voting.

Social processes are complicated for several reasons:

- Large numbers of people are involved
- People are complicated (and diverse)
- People influence each other
- Situations change in time

In the video all these complications were discussed with the help of demonstrations as example, showing the way the demonstrations come to life. Here, we will have a quick look at another example of an important social issue and examine if we are facing the same challenges as in the case of protests. So, let's have a look at another big question: how many people will vote and who will they choose?

In order to answer this question, we certainly have to think about a large number of people - all potential voters. It's not only a decision of those who cast a vote that affects the final result but also all those who - for different reasons - stayed at home. A decision whether to vote is definitely a complicated one and affected by personality, attitude towards the political system, political views but also other factors e.g. how far does a person have to travel to a polling station. It's also worth noting that people have diverse political views and different attitudes towards voting so this should also be taken into account.

It is also a case where people heavily depend on each other. If I believe many people will vote, I may be more eager to vote too. Or less eager, if I feel my vote is not going to change anything. It also depends on my knowledge about other people's views and political preferences. In case of majority rule systems, there is a strong tendency to vote strategically, not for the most preferred person but to the one that is second best but better than someone else who is close to winning. Survey results can affect my willingness to vote and my choice as well. So, each potential voter is influenced by other potential voters. As both survey results and election results in different countries show, in this case things also change in time, sometimes quite suddenly.

So, again, we have a large number of people who are complicated beings making complicated decisions and they are influencing each other, and it all changes in time. Our starting point is recognising all those complications and trying to understand the mechanisms that lead from a combination of individual behaviours to a social result. In the next steps we will go through such a process for the protest example.

Can you think of other issues that make it hard to predict the voting behaviour? Do you think something as unpredictable as the weather on the day of election affects the voter turnout or the result of the election?

5. Appleton protest – VIDEO

Click on the icon to view the video

In this video we will start investigating how demonstrations come to life - we will be dealing with a complicated social process but in order to understand the dynamics we will start with a simple example. We will have a close-up look at an imaginary village of Appleton and try to see the mechanism behind the collective behaviour of its inhabitants.

6. Questions about thresholds – QUIZ

You can use these questions to check your understanding of thresholds. Please select all correct answers.
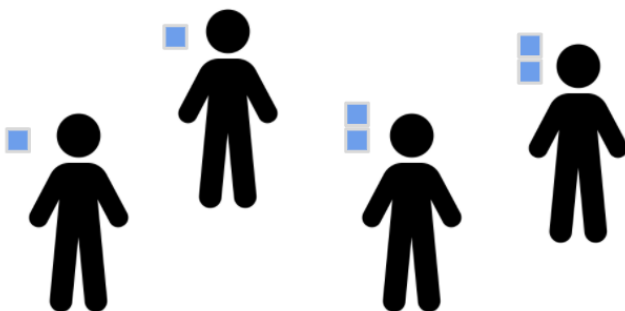
QUESTION 1

How are people in this story influenced by others?

a   People convince one another to go to a protest
b   **People observe the others and depending on the number of protesters they join the protest or not**
c   People are willing to go to a protest only if everyone else will go
d   **Some people act independently (initiators) but their behaviour can encourage others to go.**

QUESTION 2

The situation pictured below is similar to the one in Appleton - people are worried about a certain issue and are considering whether to go to a protest or not. There are only four people, two of them with threshold equal to one, two others with threshold equal to two. [image 1.7.2. below]
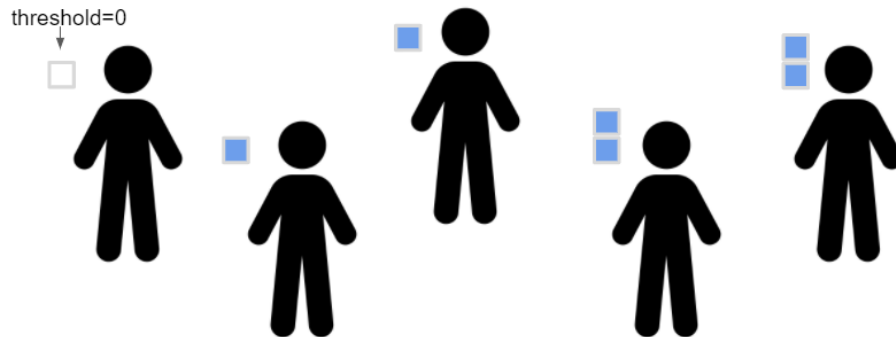

How many will join the protest?

0   1   2   4

QUESTION 3

Again, the situation is similar to the one in Appleton - people are worried and consider whether to go to a protest or not. There are only five people, one with threshold equal to zero, two of them with threshold equal to one, two others with threshold equal to two. [image 1.7.2. below]

How many will join the protest?

0	1	3	**5**

QUESTION 4

Now let's just stop for a second to think about this concept of a minimum number that triggers certain behaviours. Here, we were talking about thresholds related to our eagerness to attend a protest but in fact, they may relate to other issues. Let's see one example from a slightly different social domain:

https://www.youtube.com/watch?v=GA8z7f7a2Pk

What was the threshold for the person who joined in around 0:19 second of the video?

0	**1**	2	3

By the way, what is your dancing threshold?

7. Bus drivers' protest – DISCUSSION/EXERCISE

Bus station   © Shawn Rain via Unsplash

Let's have a look at the following case.

This is a group of bus drivers who operate local buses in a small town. They are worried about new regulations related to their working hours. They are considering joining a strike and their attitude toward the action is pretty diverse, with some people who are very motivated and some - more reluctant to join. Just as in the case of Appleton, they only decide to join the strike when their threshold is reached.

thresholds (lowest to highest): 0,1,1,2,2,4,7,8,9,9
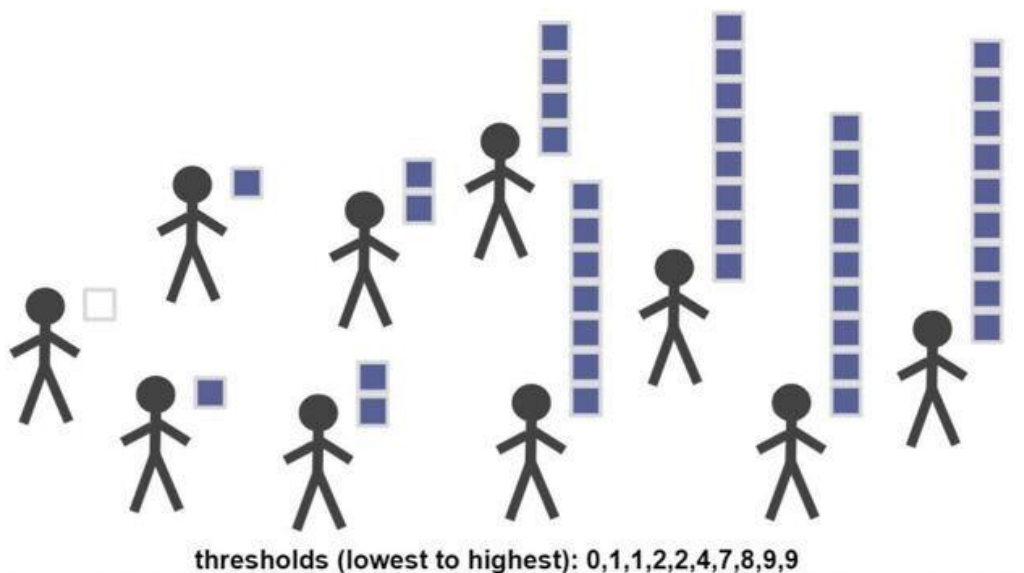
How will the process unfold in this group? How many drivers will eventually join the protest?

8. Predicting protests – ARTICLE

Demonstration © Storyblocks

In the previous exercises we examined Appleton, some simple examples and the case of a bus drivers' protest in a small town (eventually 6 bus drivers would take part in the protest while the remaining ones with thresholds equal to 7 and higher would not join in). In this article we will consider how we could predict the size of the protest before it happens - if we have some data about the attitude of the group.

Nancy is the governor of Fruit County. Let's look at the potential for protests in Appleton and other villages within the region from her point of view. Before the demonstrations start, she would like to know where to expect the biggest crowd and which village will rather not participate in the protest. In order to compare the villages a team of consultants have tried to estimate the potential by counting the average threshold in each county.

In Appleton we had the following numbers:

Thresholds in Appleton listed from the lowest to the highest:

| 0 | 1 | 2 | 3 | 3 | 3 | 6 | 7 | 8 | 11 |

A researcher sent there to screen the level of discontent in this village came back with an **average of 4.4** (sum of thresholds divided by the number of Appletoners; 44/10 = 4.4). This might be a good indicator of the "potential for protest". It means that an average citizen of Appleton needs at least 4.4 people protesting before he or she joins the protest.

Obviously, real surveys don't look like that and - on one hand, we usually only study a sample of a bigger population (which means we have less information), and secondly, we usually study more than just the average (so, we examine this information more carefully than Fruit County governor). Nevertheless, it's not so hard to imagine how some information on the discontent is lost on the way and we end up with some rough estimate of a certain issue we're interested in.

If we were a governor, we could study such estimates for different villages. It seems quite logical that if the average threshold is lower in a certain village, the potential for a protest is higher and we could expect bigger demonstrations. Should we send more police forces and ambulances in that direction? We will examine this approach in the next exercise.

9. Fruit County protests – QUIZ

In this quiz we will investigate four villages in Fruit County, we will look both at the potential for protest and for the final size of the protest in four different places.

There are four villages in Fruit County: Appleton, Berryville, Mangobrook and Limeborough that are close to the planned highway location (and below - the table of thresholds for each of them). In the case of Appleton we already know the average threshold (4,4) and the final number of protesters (9).

Village name	Thresholds (from the lowest to the highest)	Average threshold	Number of protesters
APPLETON	0 1 2 3 3 3 6 7 8 11	4,4	9
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	?	?

QUESTION 1

What is the average threshold of Berryville:

4.0

4.1

4.4

5.0

QUESTION 2

Which village seems most eager to protest (judging by the average threshold)?

Appleton

Berryville

Mangobrook

Limeborough

QUESTION 3

How many people will eventually protest in Limeborough?

0

1

5

10

QUESTION 4

In which village the protest will be the largest?

Appleton

Berryville

Mangobrook

Limeborough

10. Between intentions and actions – VIDEO

Click on video to view the trailer

In this video we will analyse what happened in the four villages and summarise the results. We will see how it is not so easy to predict what will happen in a village by simply looking at individual characteristics and how important it is to understand the mechanisms in between.

11. Understanding the mechanisms behind Fruit County protests - QUIZ

QUESTION 1

In Bananion and La Papaya there is a similar problem as in other Fruit County protests. We know that in Bananion the average threshold is 2.5 and in La Papaya it is equal to 3.5. Which of the following statements are true. Please select all correct answers.

Select all the answers you think are correct.

- We are certain that in Bananion the protest will be much bigger than in La Papaya.
- **The citizens of La Papaya are on average less eager to protest than the ones in Bananion.**
- **The protest might not take off in any of the villages.**
- **When trying to predict if the protest would take off, we should pay attention to whether there are any initiators in these villages.**

QUESTION 2

We know that in Blueberia and in Malinowka (both have 10 citizens) there was the same situation as in other Fruit County Protests, meaning that people were unhappy about the highway and their attitude towards protesting was diverse. We also know that in Blueberia as much as 9 people turned up. In Malinowka only one person protested.

Which of the following statements is true?

- The protest in Malinowka was smaller as there were no initiators there.
- **It is possible that in Blueberia the thresholds were the following: 0, 1 , 2, 3, 4, 5, 6, 7, 8, 9 (average 4.5) while in Malinowka the thresholds were the following: 0, 2, 2, 2, 2, 2, 2, 2, 2, 4 (average 2.0).**
- We know for sure that the average threshold in Blueberia is much lower than in Malinowka.

12. It's not their fault! – ARTICLE
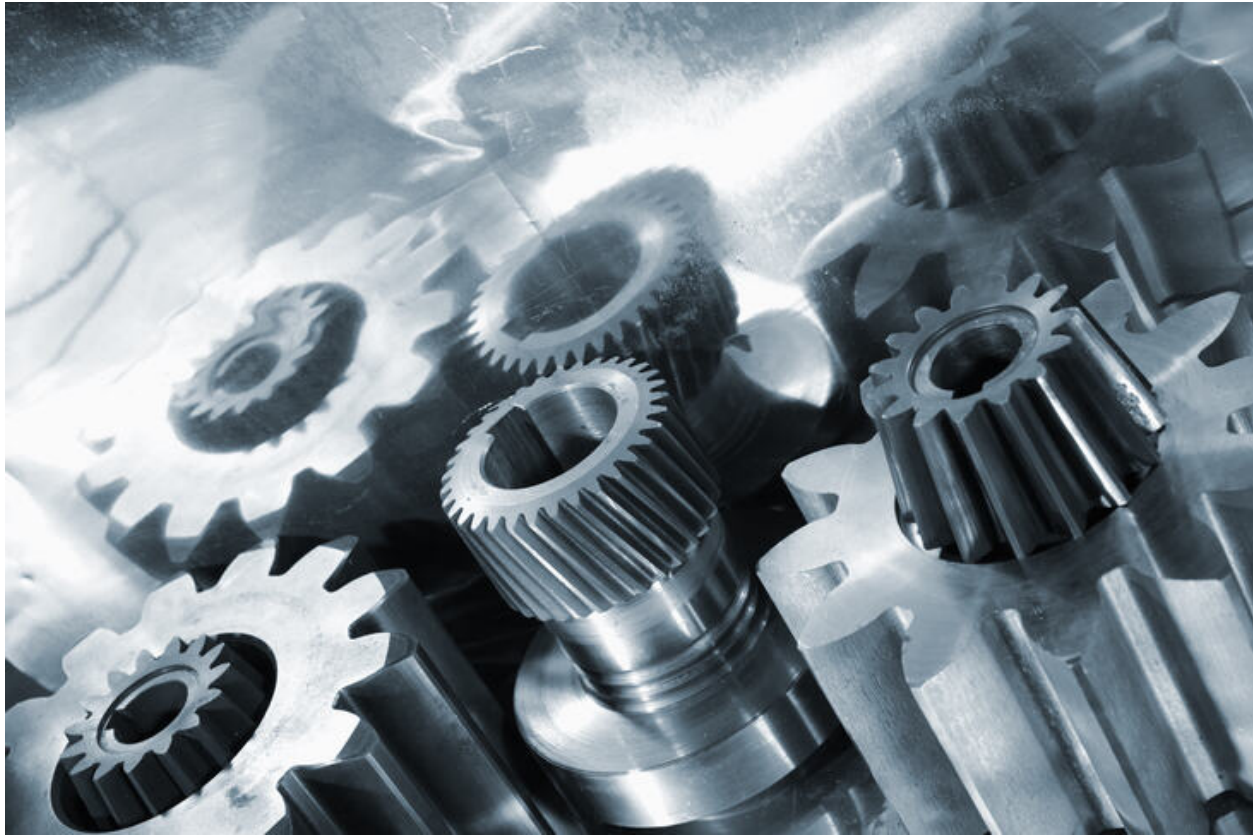
Mechanisms © Storyblocks

In this article we will deal with a situation where we know the results, namely the size of the protest, and on the basis of this knowledge we try to deduce what the attitude of the people was *before* the protest. We will examine how the understanding of the mechanism will make us see the situation in a new light.

One of the consequences of having a closer look at a mechanism behind a social process is that it is no longer so easy to blame the people for a result on the social level (e.g. a result that we find not satisfying).

For example, sometimes when we see that in some places there are huge protests and in other places the demonstrations related to the same issue are much smaller (or none at all) we all tend to jump to conclusions about those different locations. We would say 'In this city they are so passive' or 'In this village nothing ever happens'. Or "the inhabitants of Y are always so furious about everything", "any small issue and they're all in the streets".

These statements could be translated to statements related to threshold levels made on the basis of the group result. It sounds a bit like "If there are as many as 9 protesters there, the threshold level must have been really low" or "If there is no protest there, all the inhabitants are bound to have a really high threshold" (Needless to say that both statements are false).

But if we understand the mechanism, it leads directly to a conclusion that the relation between threshold levels (attitude) and the size of the protest is not that simple. In Appleton and Berryville we had the same average threshold level and totally different results. In Limeborough where the average threshold level was very low, there was no protest at all! (In the previous exercise we had even more examples where there was no obvious link between the average threshold level and the size of the protest). Apart from the average threshold level there are other factors that influence the size of the protest.

Apart from high average threshold ("people are reluctant to protest"), there are other reasons why a protest might be small:

- no initiator (or not enough initiators);

- early-goers group is too small;

- there are some discrepancies, e.g. many people have a low threshold, but as they don't know about each other, they all stay at home.

So, before we jump to conclusions about the people when we see the group result, it's worth taking a step back and thinking about the mechanism that might have led to such a group result and it's not only in case of protest organisation but social processes in general. Digging deeper into studying dynamics drives us away from simple explanations.

Changing the communication channel – EXERCISE

Now, please think about another example: In a certain company a change of the communication channel was introduced. Employees were asked to switch from using e-mails to an internal company chat. The transition isn't going so well everywhere. In one branch of this company it went well and all employees switched to the company's internal chat. In another branch everyone's still using e-mails. It would be easy to put the blame on the people in this branch, but what else might have led to such a result? Can you apply the approach presented in the article to discuss what might have caused such a difference?

13. Making a perfect protest – QUIZ

QUESTION 1

When looking at the graph, could you think of a way of changing only one person's attitude in a way that there are exactly five people protesting in Appleton?

Village name	Thresholds (from the lowest to the highest)	Average threshold	Number of protesters
APPLETON	0 1 2 3 3 3 6 7 8 11	4,4	9

- Yes
- No

CORRECT: YES, You're right! If we change one threshold "3" into a "6" or higher.

QUESTION 2

When looking at the image below, could you think of a way of changing only one person's attitude in a way that there is a huge protest in Berryville?

Village name	Thresholds (from the lowest to the highest)	Average threshold	Number of protesters
BERRYVILLE	1 1 3 3 3 3 6 7 8 9	4,4	0

- Yes
- No

CORRECT: YES - You're right! If we change the most reluctant person into an initiator, this will create a true avalanche.

14. The Butterfly Effect - ARTICLE + VIDEO

The Butterfly Effect

© Storyblocks

As you have seen in the previous step, sometimes small changes of a situation can lead to big changes in the final result. In some of the examples you could see that it took only ONE person to change his or her attitude in order to completely change the dynamic of the protest. This is an observation that you might associate with one quite famous term. Maybe you've come across the term "Butterfly Effect"?

Butterfly Effect is the sensitive dependence on initial conditions typical for complex systems in which a small change in the starting point can result in large differences in how the whole process unfolds later. It is worth underlining that it's not the situation where each change has such a huge impact on the final result but rather the whole system of elements is connected in such a way that it is vulnerable for small changes in some points or areas or points in time.

In other words, sometimes a small change can have no impact at all, sometimes it creates a proportional change (small change in initial conditions->small change in the final result) and sometimes it may have a huge impact on the way the process unfolds. Like throwing a small rock on the top of the mountain - sometimes it'll just drop, sometimes it'll make a few small rocks to tumble down and in other cases or thrown into some vulnerable spot - it can create an avalanche. And if you study such a complicated social process, vulnerable to small changes, it makes it really difficult to predict the final outcome. If one person can sometimes tip the scales - how can you predict anything with certainty?

Please watch the video below, describing this effect in more detail.

Click on the image to view the video

Sometimes a small change in a local neighbourhood or in an organisation, or within a company has a surprisingly big impact on all the people within the community - have you ever experienced such a situation? Could you describe it?

15. Questions about the Butterfly Effect – QUIZ

QUESTION 1

What is the relationship of the "Butterfly Effect" with meteorology?

- This phenomenon greatly facilitates weather forecasting.
- This metaphor is often used in weather forecasts to herald the beginning of summer - the time of the butterflies.
- **This effect was discovered during observation of several runs of the weather model.**
- This phenomenon was observed by Edward Lorenz during his experiments in a meteorological laboratory in Texas where he worked on inducing tornadoes in the laboratory conditions.

QUESTION 2

Which of the following sentences related to the Butterfly Effect are true? Please select all correct answers

Select all the answers you think are correct.

- Each small change of initial conditions leads to huge changes in the future
- **Sometimes a small change of initial conditions might lead to huge changes in the future while sometimes it might change nothing at all**
- **One of the consequences of the butterfly effect is that (if we have enough data) while we can usually predict how a process will unfold within a short range of time, it is difficult to predict how processes unfold further**
- Butterfly Effect makes it pointless to predict anything at all because complicated processes are totally random

16. How micro behaviours lead to macro outcomes – ARTICLE
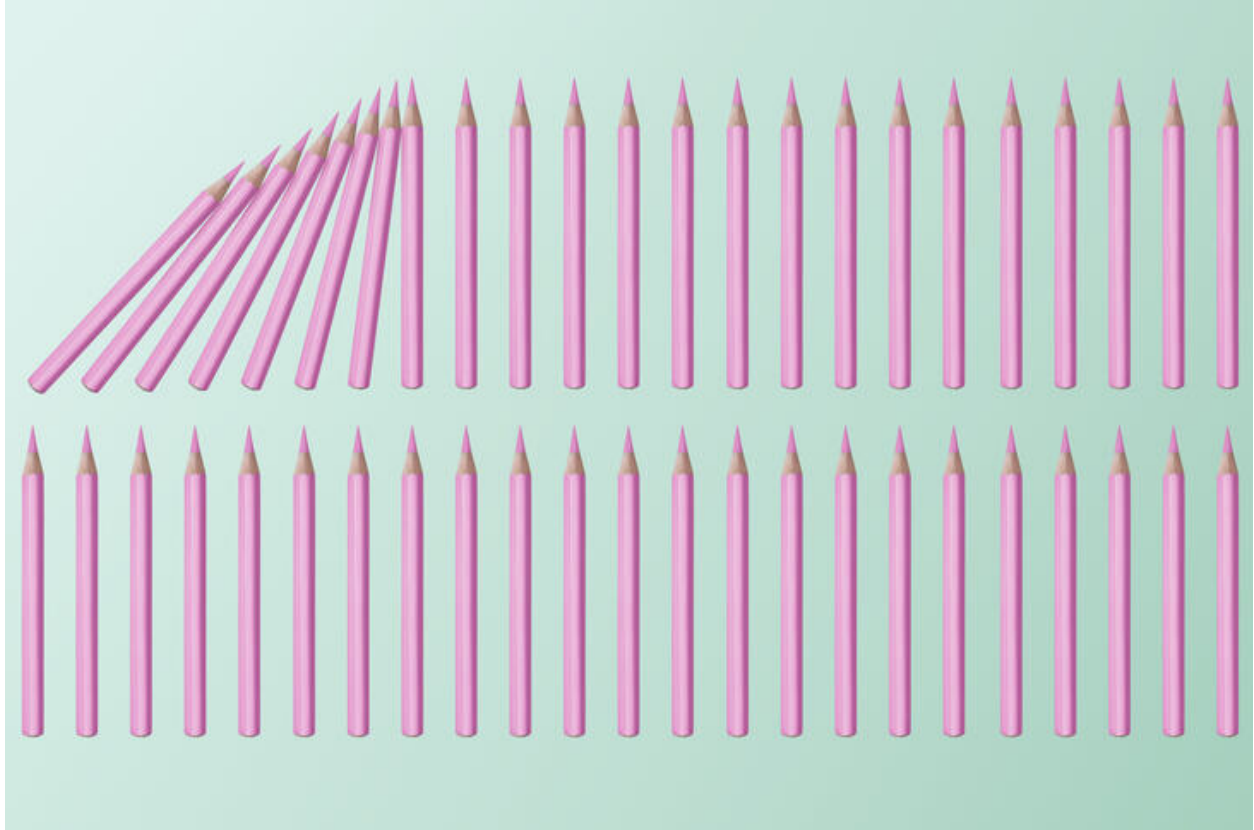
Domino effect © Storyblocks

Sometimes it appears that a small spark can lead to a big social action, while in other cases it seems that everyone would want something to change (e.g. an unfriendly organisational culture) but people seem to be stuck and nothing happens.
Dynamics of demonstrations is a typical case here - we already know that it is hard to predict how many people will come to a demonstration. In the case of Fruit County protests we could observe that similar levels of discontent could produce a small or a big protest, depending on the presence or absence of initiators, the size of the early-goers group or discrepancies between thresholds.

Getting back to real protests - what we can also observe is that sometimes when people do turn up and just march through the city with their banners, a seemingly small incident can change a peaceful march into a riot. In other words, sometimes we cannot see the potential of a collective action and it is revealed only when some people initiate the action. Or despite the fact that there is some potential for such action, it doesn't lead to anything. This might be puzzling but it's just one of the examples of social mechanisms that lead from individual attitudes or ideas, or desires to the final result that we can observe in a group.

In such phenomena we can see two 'levels': the individual level of separate people (the micro level) and the group level where we can see the combined effect (the macro level). The problem of connecting those two levels is called the *micro-macro problem*.

In the previous steps we explored a model of a social process - we analysed how a protest comes to life, step by step, starting with a simple observation that for each protest to occur, individual people have to make a decision that they want to join it. In this model we also assumed that people are more willing to go provided

that some people are protesting. We used the term threshold to describe a minimum number of protesters needed for a certain person to join the protest. (It's worth mentioning that this simple model is an example of a wider array of threshold models proposed and investigated by a sociologist Mark Granovetter in the 1970s.) Although the model itself was pretty simple, the results were not so obvious. It helps us understand how some collective actions develop.

So, let's describe it step by step. In the case of a demonstration we explored a very simple social process: people (on the micro level) were more or less eager to go to a protest (which was represented by their thresholds) and they made their decisions based on observation of each other's behaviour. However, the result on social (macro) level wasn't just a simple sum of independent behaviours of individuals. People influenced each other, initiators played a really important role in the process while discrepancies made it difficult for the number of protesters to grow. So, a lot happened between the micro and the macro level!

Although it was a simple example, it helped us illuminate some pretty important issues related to collective actions, for example the importance of the initiators and the size of the early-goers group for the growth of the protest. This example shows how - in order to understand social behaviour - we need to pay attention not only to the individuals but also to what is between them - for example to the way they influence each other.

There are a lot of other processes that lead from individual behaviours (micro) to a social effect (macro):

For example, if we have a number of individuals that produce a certain commodity and a number of potential buyers, what connects them all is some sort of market. And in order to find out how the producers and customers end up - do they succeed in selling or purchasing a good and what price they settle on, we need to study the characteristics of the market. In the well-known story of the invisible hand of the market (which is now perceived with much more caution than before), eventually they are all happy with the final result. Market is an example of a mechanism that connects individual behaviours and their result on a macro level.

Another example: sometimes our individual behaviours, which seem understandable and don't seem harmful at all on an individual level, like a simple decision of driving a car to work, lead to traffic jams which is far from satisfying for all the commuters and city-dwellers.

Image: *Traffic jams are not created on purpose, but are an effect of thousands of decisions, each of those decisions harmless, but taken together, rather problematic, both for the drivers and other city-dwellers.*

The way how thousands or millions of individual decisions can affect the whole society is often unintuitive and unexpected. People want to buy certain products before the others do and their behaviour – taken together – leads to a shortage that wouldn't have occurred if they didn't fear this shortage. On the other hand, if many people fear that a local event will be too crowded, they won't come which actually prevents the fulfillment of their expectations.

Image: *Self-fulfilling prophecy - people who were stockpiling toilet paper because they feared the shortage of this product, caused the shortage themselves.*

There are a lot of different mechanisms that lead from individual ideas, needs and attitudes to the combined effect. And what is important, just as in the story of Fruit County villages there are many unexpected things that can happen on the way. Egoistic motivations can lead to a positive result, good intentions can lead to creating problems, we can observe self-fulfilling prophecies or self-cancelling prophecies. When we are dealing with social behaviour we should pay attention not only to what people think but also how they are connected, how they communicate, how they influence each other, what they expect from each other etc.

And if you are interested in exploring in more detail how seemingly rational choices can lead to problems, try out our [Are we doomed to destroy our planet?](#) course on Futurelearn (coming soon).

Additional Reading
A much more advanced approach to threshold models: check out [Threshold Models of Collective Behavior](#).
American Journal of Sociology, written by Mark Granovetter in 1978.

17. How harmless actions can lead to social problems –DISCUSSION

Sold out © Storyblocks

You've read about examples where a seemingly harmless activity, quite understandable on an individual level, such as buying some more toilet paper just in case, can lead to a shortage and conflicts which is a social problem.

Can you think of more examples where individual behaviour seems harmless at a micro level, but is actually not so good for society as a whole (macro level)? Please share your thoughts with other learners.

18. Model, modelling and simulation – ARTICLE

Police car toy © Syed Hussaini via Unsplash

In this step we want to take a closer look at what we have done so far.

We started from a wider problem of spreading protests. Then we focused on the issue of individual decisions about joining the protest and thought about the way people are influencing each other. We constructed Appleton village and we decided what features of its inhabitants and relations between them will be the most important for the process we want to understand.

We also made several decisions: how we construct the protest, what elements of real protest we should choose, what features the potential protesters should have (threshold) and how a decision of joining the protests or not will be made (new protesters will join the protest if there are enough people protesting already. It means that their threshold is reached).

This process of choosing elements is called **modelling** and a set of elements that describe something for some purpose is called a **model**. When we choose certain initial conditions and observe how the process

unveils, we carry out a **simulation**. In the case of the model of protest in Appleton and other Fruit County villages, we carried out a simple simulation (by counting protesters on paper).

Although models are often associated with something very abstract, they surround us everywhere. Think about a map, which is a model of terrain made for navigation. Toys are often models of real life items, for example a toy police car is a model of a real vehicle made for children in order for them to learn how to recognise certain features of cars.

Road map by Thomas Kinto on Unsplash.

In both cases a process of modelling was based on considering for what purpose a model should be created and selecting certain elements of reality. In the case of a road map its most important role will be displaying roads and transport links rather than natural geographical information, which we will find on the physical map.

Models can be more or less detailed. Our model of protest is quite simple. But there are models that are much closer to reality. Such an example could be a model of a human body on which medicine students are trained. Is it always better to have a more complicated and accurate model? Not always. In the case of a police car for younger children it is absolutely sufficient if it has proper colours and car lights.

In social sciences we often start from simpler models. In the next steps you will see that we will complicate our basic model or remodel it, concentrating on other properties. However, we have to be careful - when a model is too complicated it is hard to analyse the results of simulation.

Can you think of any real-life models - objects that are models for something bigger and more complicated? What does this object model? What characteristics of this object were kept and which of them were left out?

What is the purpose of the model? Please share your examples with other learners and explore which examples they have come up with.

19. Modelling individuals as crash test dummies – ARTICLE + VIDEO

Crash test dummies, © Insurance Institute for Highway Safety

Let's leave butterflies and toy police cars and come back to the residents of Fruit County.

Probably you have noticed that in the threshold model people are very simplified. A threshold sums up their attitude towards the protest and then - after they make a decision - they also have a colour (gray or purple) that indicates if they are protesting or not. And that's it! They don't have a lot of features that characterize people - profession, level of education, life history, physical characteristics, musical preferences... Why? Because we decided that it is **enough** that we need in our story - we **chose** those features which are the **most** important for understanding the phenomenon. And we hope that you agree that - under certain conditions - it was really helpful in understanding and illustrating the process of demonstration spread.

Of course, you can say - it is too simple, real people are much more complicated and there are for sure other features which can influence a process of protesting. Yes, that is true, but it was our **choice** - when we

construct a model, we start from making decisions on choosing some elements and skipping the others, depending on what phenomenon we want to present.

Source: [Minecraft](#) and [The Sims 4](#)

There is one important principle: the simpler model we choose, the easier it is to control the process and to analyse it. On the other hand, a more complicated model will be closer to real life. The decision is in our

hands. Remember, we can always start from something very simple and then add more features gradually. For example we can decide that apart from the threshold, political views of Fruit County citizens could be important. Then we can add this feature, remodel the whole process a bit, and see what happens. However, sometimes a simpler model, with a very elementary concept of individual behaviour is enough to show the most important parts of mechanisms.

Now let's take a look at a quite well-known model of the human body used for testing car safety, the crash test dummy.

Source: wikipedia

You can see that - in some aspects - it is definitely more complicated than Fruit County inhabitants but still much simpler than real people! For example, crash test dummies have a weight and height and - which may come as a surprise - articulating vertebrae, but - if we compare them to Appeltoners - they do not have any willingness to protest. Here, we should come back to the purpose of constructing the model: crash test dummy has those features of a human being that are important in the case of car accidents while Appeltoners and other Fruit County residents have the features that are important for understanding the dynamics typical for organising protests.

With all that in mind, please watch this video about crash test dummies (warning: contains some disturbing images of car accidents - artificial - but still a bit scary!).

Click on video to view the video

Think about features that crash test dummies have and try to compare it with features of real people and citizens of Fruit County. Please share in the discussion section.

20. Universal models – VIDEO

Click on video to view the video

In this video we will see how the same model can be used for investigating different processes provided they share the same underlying mechanism. In short, we will be discussing the universal nature of models.

What are other social processes where the more people do something the more we are prone to do it too (similar to the underlying mechanism described in the video and in the previous steps)?

Could you please name and describe one or more of such processes that come to mind? Please share with other learners and find out which examples they came up with.

21. Wrap up of Week 1 – ARTICLE

Well done, you have completed the first week of the course. We hope you enjoyed learning with us so far.

You did a lot this week:

- you started with the question why social processes are so hard to predict

- you focused on the way how micro-behaviours lead to - often unexpected - results on a social level

- we developed a very simple model of how a protest is organised and spreads (or not) and you investigated it step by step

- you've explored the following terms: **model, modelling and simulation**

- you experienced how a small change can sometimes lead to a huge change (and sometimes lead to no change at all)

- and you discussed how one model can be useful across different settings

Next week we'll investigate how the protest would spread if people were influenced by their friends instead of sheer numbers of protesters and this will lead us to the concept of social networks.