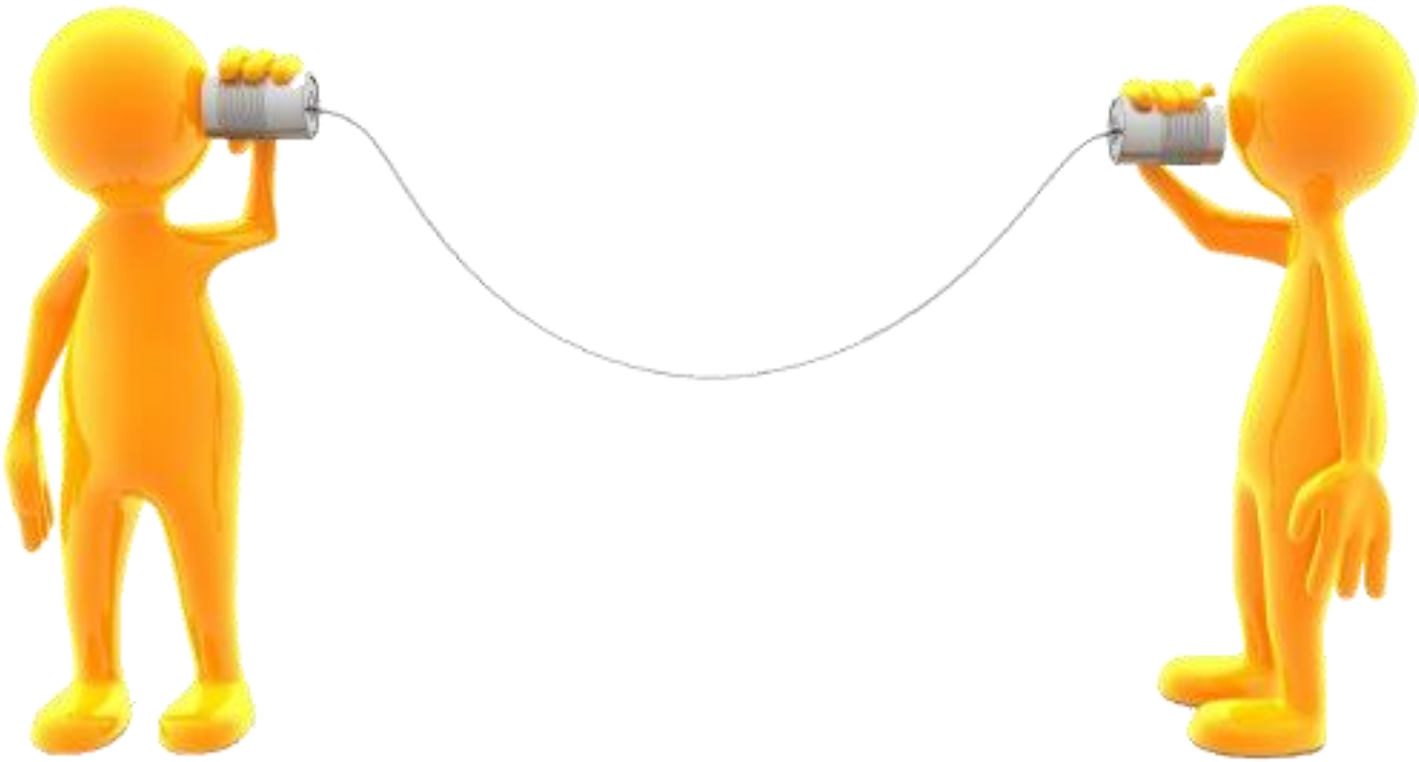
Universiteit Utrecht

Copernicus Institute of Sustainable Development

Framing CCS

Exploring different ways to tell stories about CCS



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Communicate early, instigate trust & compensate.

But what to say?

Pre-post-test experimental designs with control group

Or: choice models

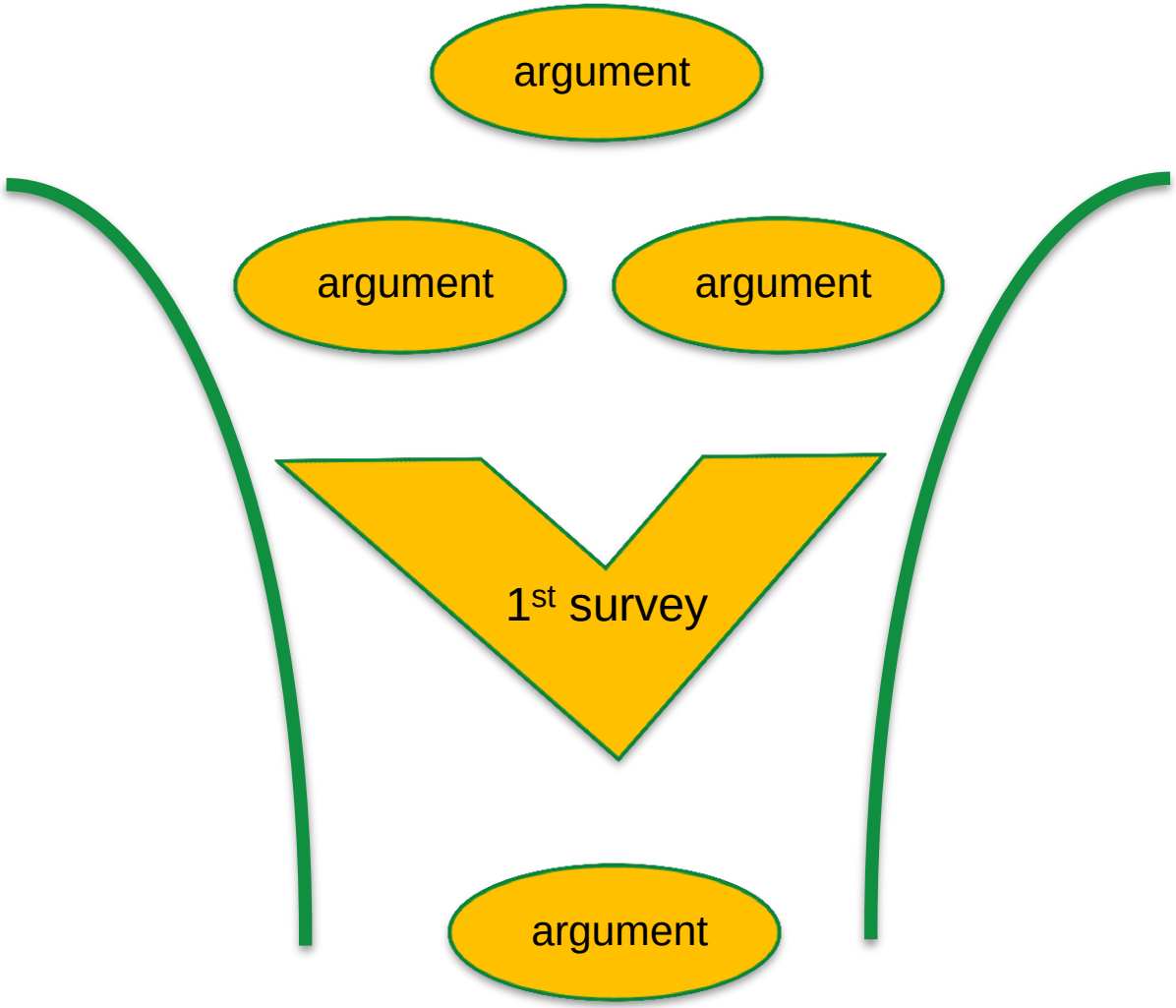
What's a choice task?

Argument 1	Argument 2
"CCS can be used in industries where no other possibilities for CO_2 reduction exist".	"A waste product such as CO_2 should be properly tidied up."
Which of the above arguments…	
… do you think is most persuasive?	
□ Argument 1	□ Argument 2
… do you think is most important?	
□ Argument 1	□ Argument 2
… is the most new to you?	
□ Argument 1	□ Argument 2

CCS Attitude Pre-test

Argument 1	OR	Argument 2
Argument 2	OR	Argument 3
Argument 3	OR	Argument 4
Argument 4	OR	Argument 5

CCS Attitude Post-test


argument
argument
argument
1st survey
argument

Study 1: Research question

*What arguments **for** and **against** CCS are most **persuasive, important** and **new** for **different groups** of people?*

Method

Discrete choice experiment

- Full factorial design
- 32 arguments (16 pro, 16 con)
- 8 choices p.p.

Sample & Data collection:

- Representative NL, >18, online survey
- Control for position & length of arguments
- Randomization

Seperate groups

- Pro arguments (N=465)
- Con arguments (N=455)

Measurement & Analysis

Measurement

- Attitude towards CCS
- Socio-demographics
- Other stuff

Analysis

- Random coefficient conditional logit
- Extended to a latent class model
- Latent gold

ARGUMENT MAP CO_2 CAPTURE AND STORAGE (CCS*)

Survey 1: top 3 pro arguments

1. "CO_2-storage can be used in **industries** where no other possibilities for CO_2 reduction exist".

2. "A **waste** product such as CO_2 should be properly cleaned up."

3. "CO_2-storage is **safe**. It will be stored in gas fields where natural gas has been stored for millions of years."

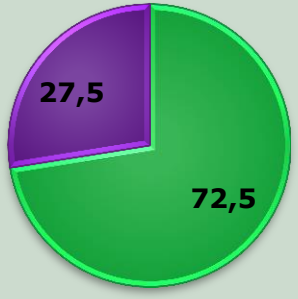
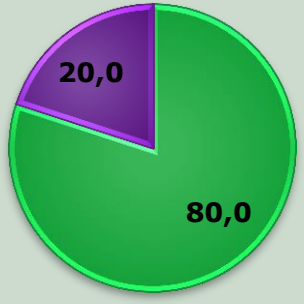
Survey 1: top 3 con arguments

1. "It is better to **avoid** CO_2-emmisions than to store the CO_2."

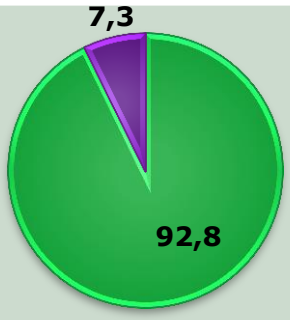
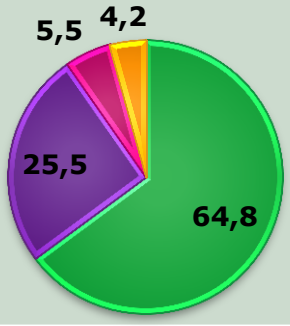
2. "CO_2-storage is new and has never been applied on a large scale. The **risks** are therefore not fully known."

3. "CO_2-storage is more **expensive** than solar or wind energy in the long term."

Results: LCA pro arguments

Cluster	Persuasive	Important
		
1	-	-
2	Relative advantage	Climate & economics

Results: LCA con arguments

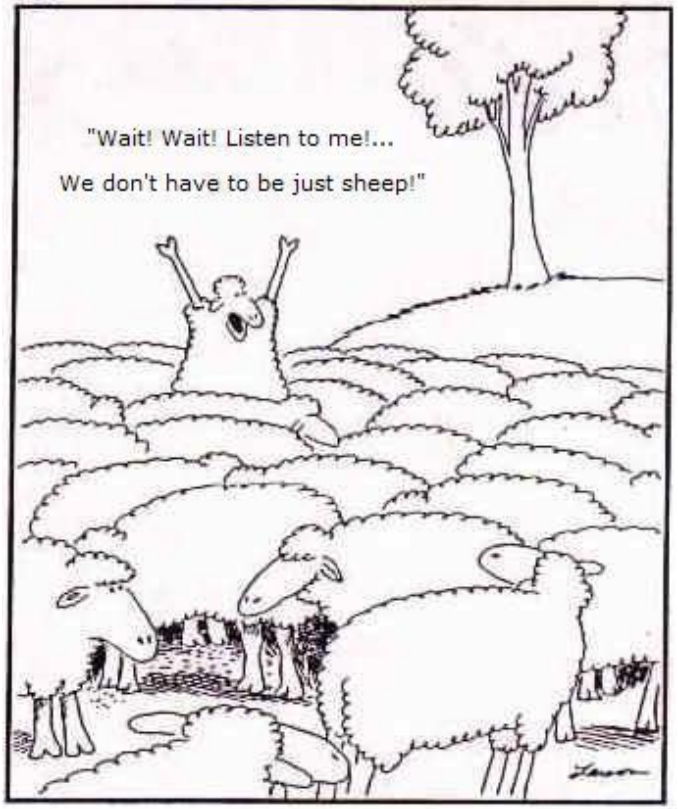
Cluster	Persuasive	Important
		
1	-	-
2	Dread risks	Relative disadv.
3		Dread risks & climate
4		Dread risks

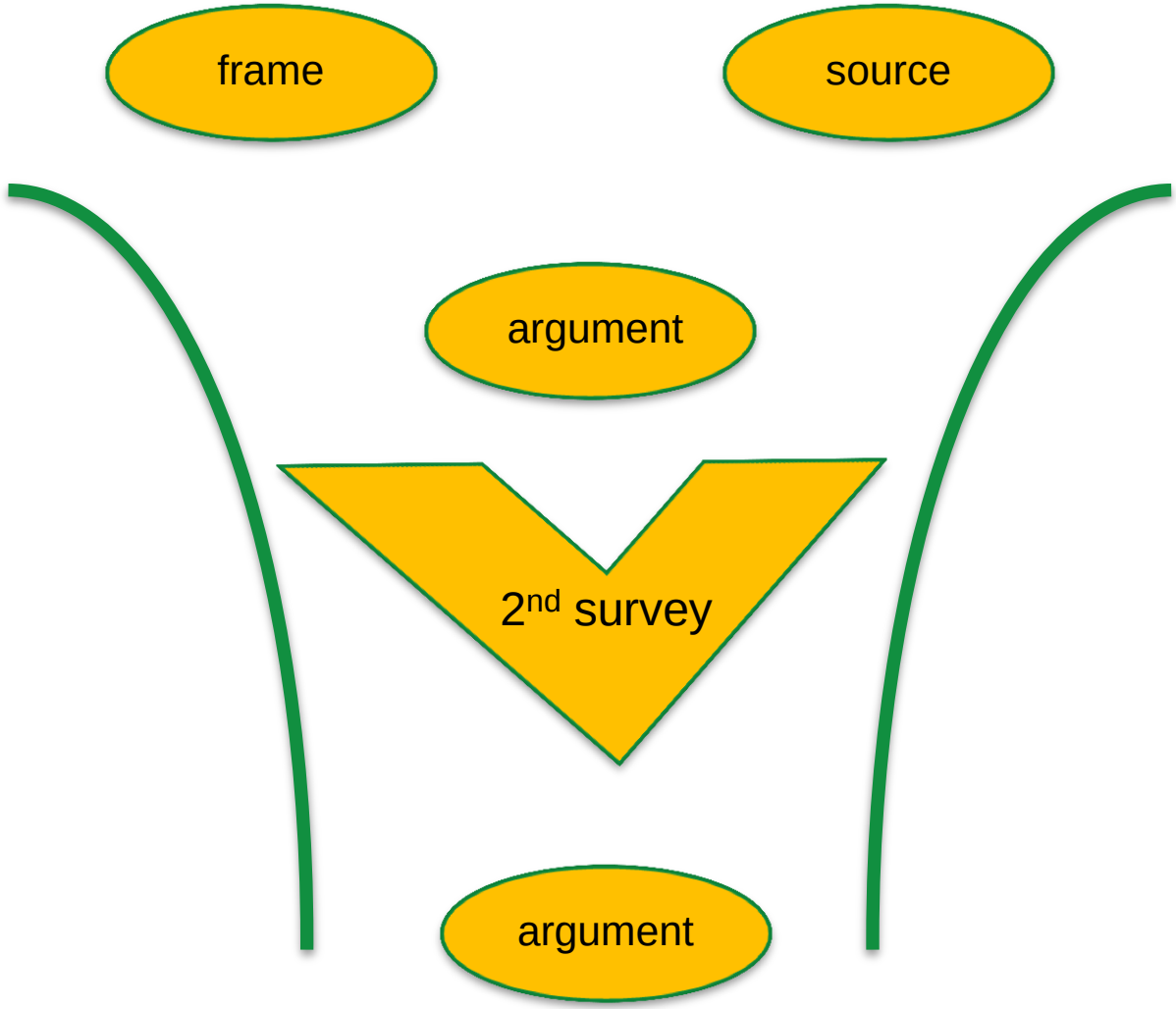
Conclusions

1. Normative arguments are most persuasive and important

2. “Technical” energy & safety arguments are newest

3. Considerable heterogeneity among respondents
   - Economic solution
   - Dread risks




frame
source
argument
2nd survey
argument

Study 2: Research question

*What is the effect of **argument content, frame, and source** on the **persuasiveness** and **credibility** of arguments for or against CCS for **different groups** of people?*

Argument frame

Easy / hard frames (*political communication)*

- Easy
  - Symbolism
  - Outcome
- Hard
  - Conditions
  - Example

Prospect reversal (*social psychology)*

- Foregone gains / losses

Reference frame:

The development of technology for CO_2-storage contributes to employment and economic growth.

Easy: Outcome

CO_2-storage is good for the economy.

Easy: symbolism

Germany is the frontrunner with solar and wind energy.

The Netherlands can still be the frontrunner with CO2-storage and earn a lot of money.

Hard: explanation

The development of technology for CO2-storage attracts firms. For this reason CO2-storage contributes to employment and economic growth.

Hard: example

The harbor of Rotterdam would like to earn money with CO_2-storage. This harbor is of critical importance to the Dutch economy.

Foregone gain:

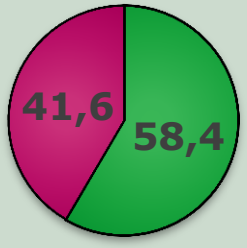
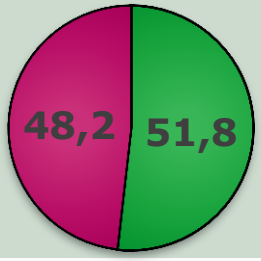
Without the development of technology for CO_2-storage there will be less employment and economic growth.

Argument source

- **Four types:**
  - Environmental NGOs
  - Energy companies
  - Scientists
  - Government
- **Combinations of 2**
- **All**
- **None (reference)**

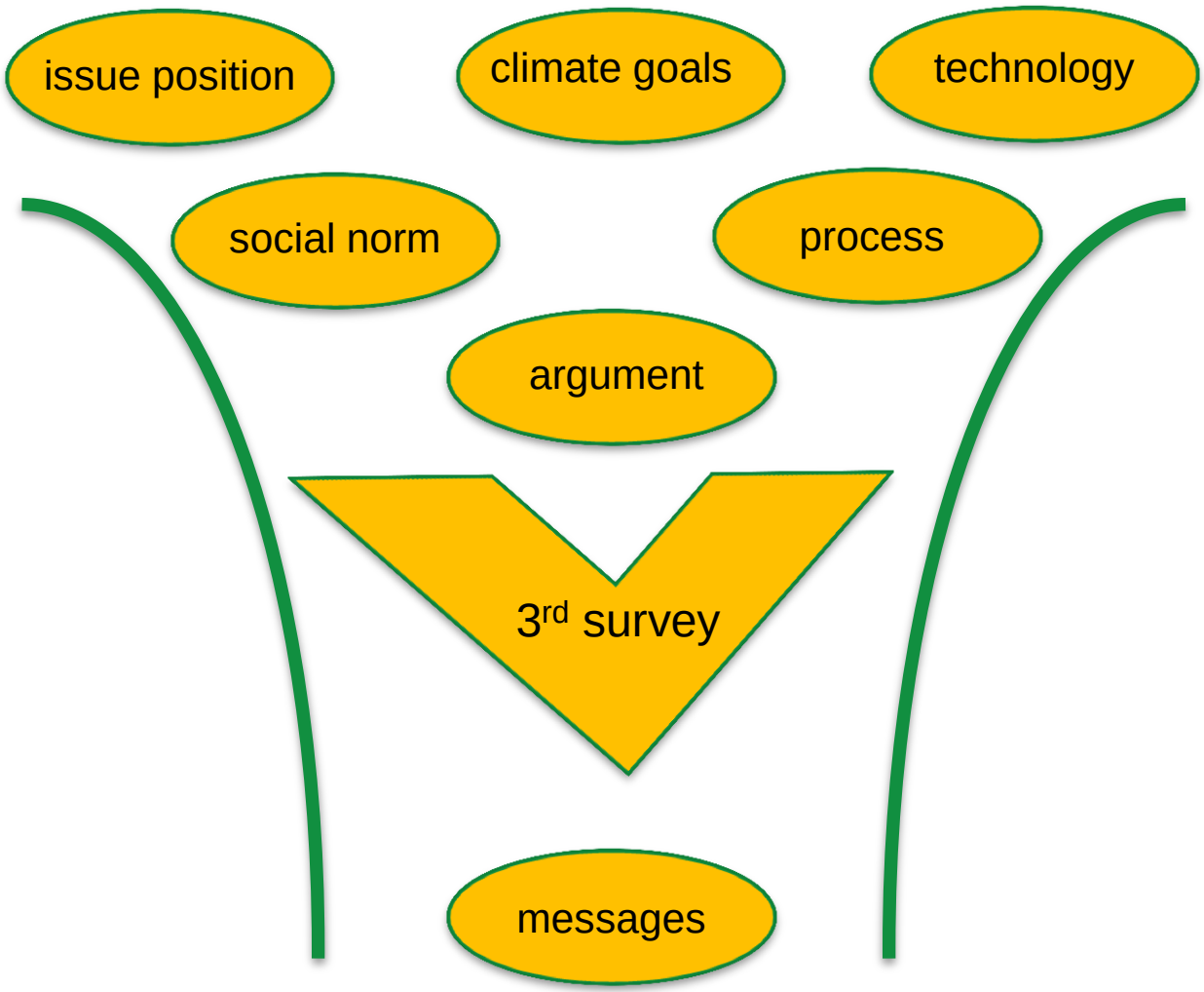
Example choice set

Message 1	Message 2
Message from an energy company "CCS can be used in industries where no other possibilities for CO_2 reduction exist".	**Message from an environmental organization** "A waste product such as CO_2 should be properly tidied up."
Which of the above messages…	
… do you think is most persuasive?	
□ Message 1	□ Message 2
… do you think is most credible?	
□ Message 1	□ Message 2

	Persuasive		Credible	
				
Class	**1**	**2**	**1**	**2**
Content	Pro	Con	Pro	Con
CCS Attitude	+	-	+	-

Conclusions

1. Discuss norms and values
2. Scientists most credible and persuasive
    I. Combinations of sources also work (NGOs & energy companies).
    II. NGOs more con CCS, scientists more pro CCS
3. Explanation works, one-liners don’t (in this context).


issue position
climate goals
technology
social norm
process
argument
3rd survey
messages

Message from an environmental agency

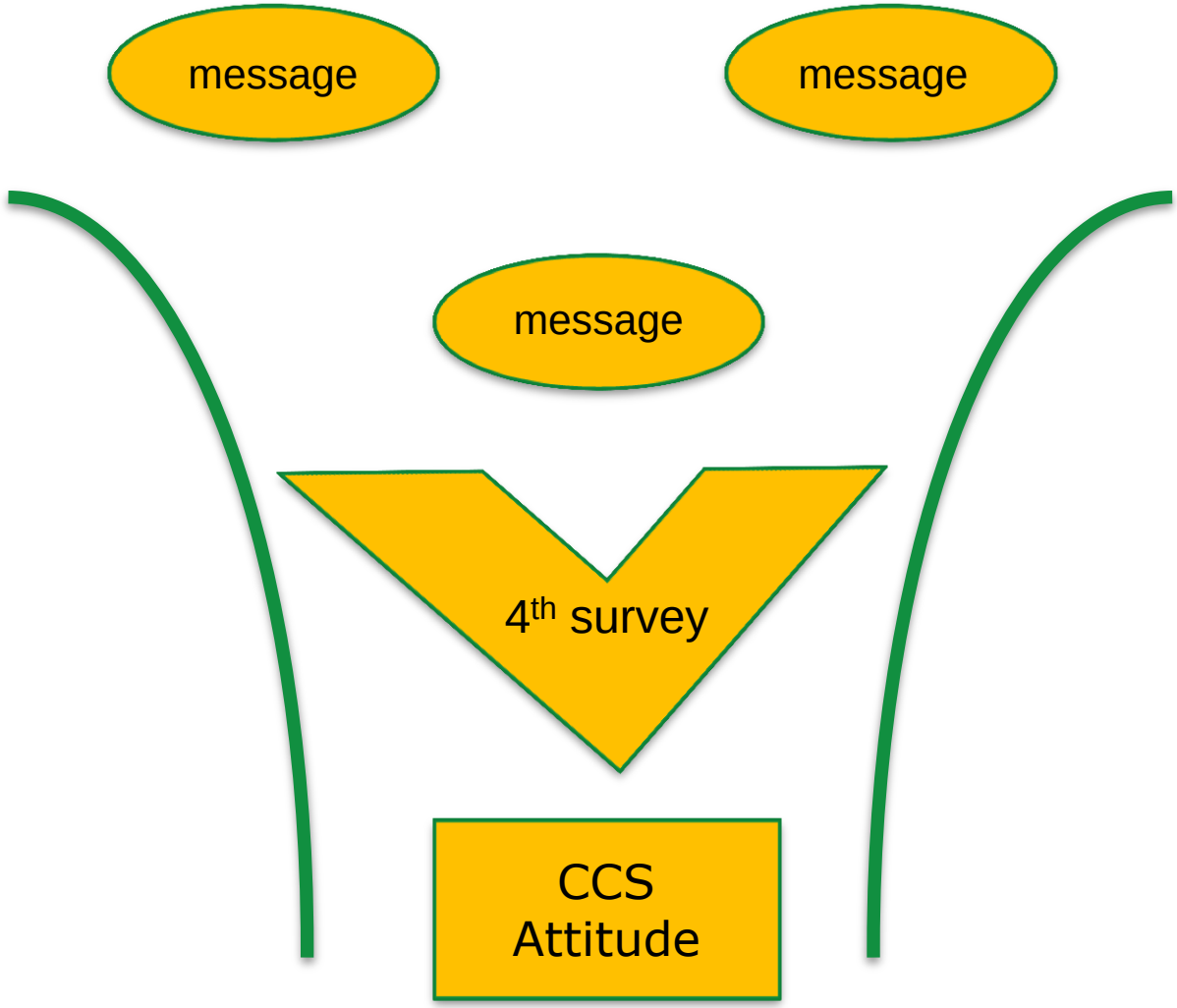
In order to mitigate climate change the emissions of CO_2 should be reduced. CO_2-storage is one way to achieve this reduction. (**Goal of CCS & climate change)**

With this technology CO_2-gas is separated from the emissions of, for example, a power plant. The CO_2 is then transported throug a pipe line to a location in the Netherlands. There, the gas is stored in an empty gas field at a depth of several kilometers for a long period of time. CO_2-storage will be combined with other ways of mitigating climate change, such as using solar panels and wind turbines. **(explanation)**

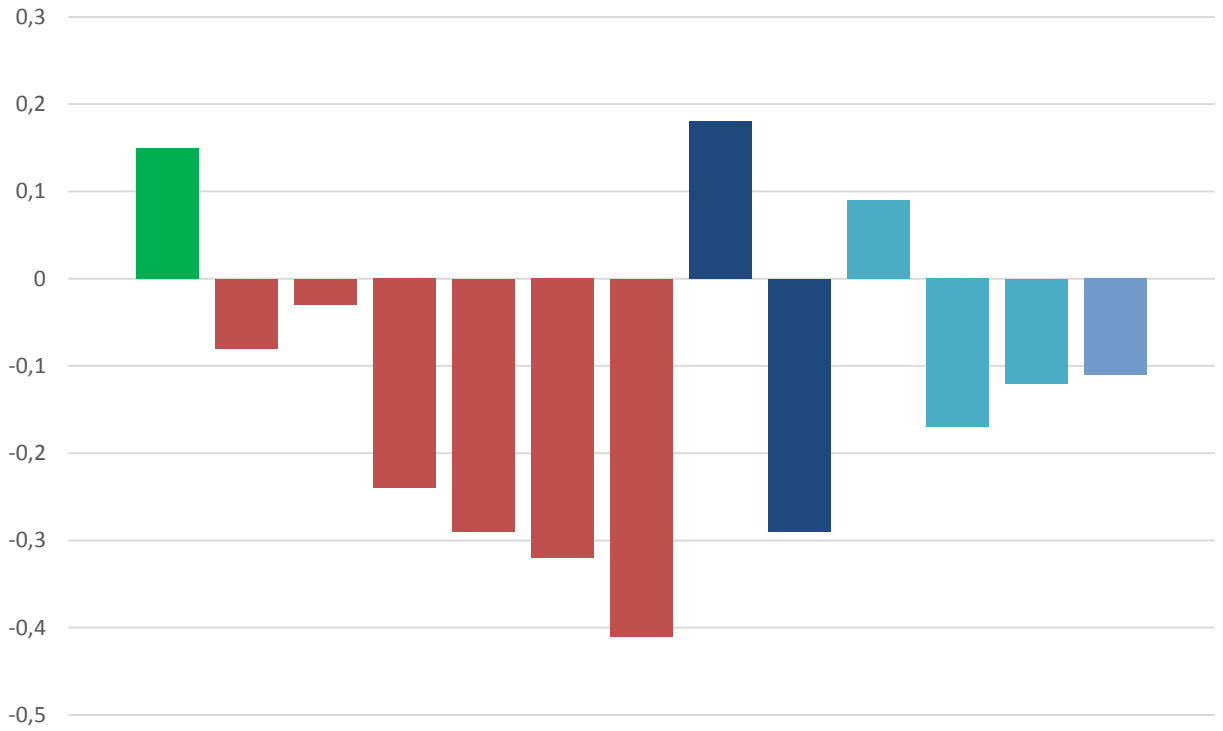
Research shows that 62% of Dutch citizens opposes this plan. We consider it a bad thing that CO_2-storage can lead to a decrease in property values in the storage vicinity. Also, in case the CO_2 leaks on a windless day, a suffocating cloud can appear. **(arguments)**

Therefore, we oppose the use of CO_2-storage in the Netherlands. The national parliament will decide whether to use CO_2-storage or not. **(opinion on issue & process)**

Cluster 1	Cluster 2	Cluster 3
Source, social norm & specifics	Argument	Social norm & source
Opinion seeker, slow	Opinion leader, slow	Opinion seeker, fast


message
message
message
4th survey
CCS
Attitude

CCS attitude change



Take home message

- Appeal to personal norms
- One-liners rarely work
- People are heterogeneous (not the same)
  - Different topics
  - Different ways of information processing

Future directions

Framing can be included as a factor in conjoint analysis:

- For robustness checks
- For examining the effect of framing on the experiment

Extension to effects of medium of communication.

Social influence & learning in decision making.

Questions?