

Effects of Text and Visual Depictions of CO₂ Storage on Information Processing, Risk Perceptions, and Attitudes

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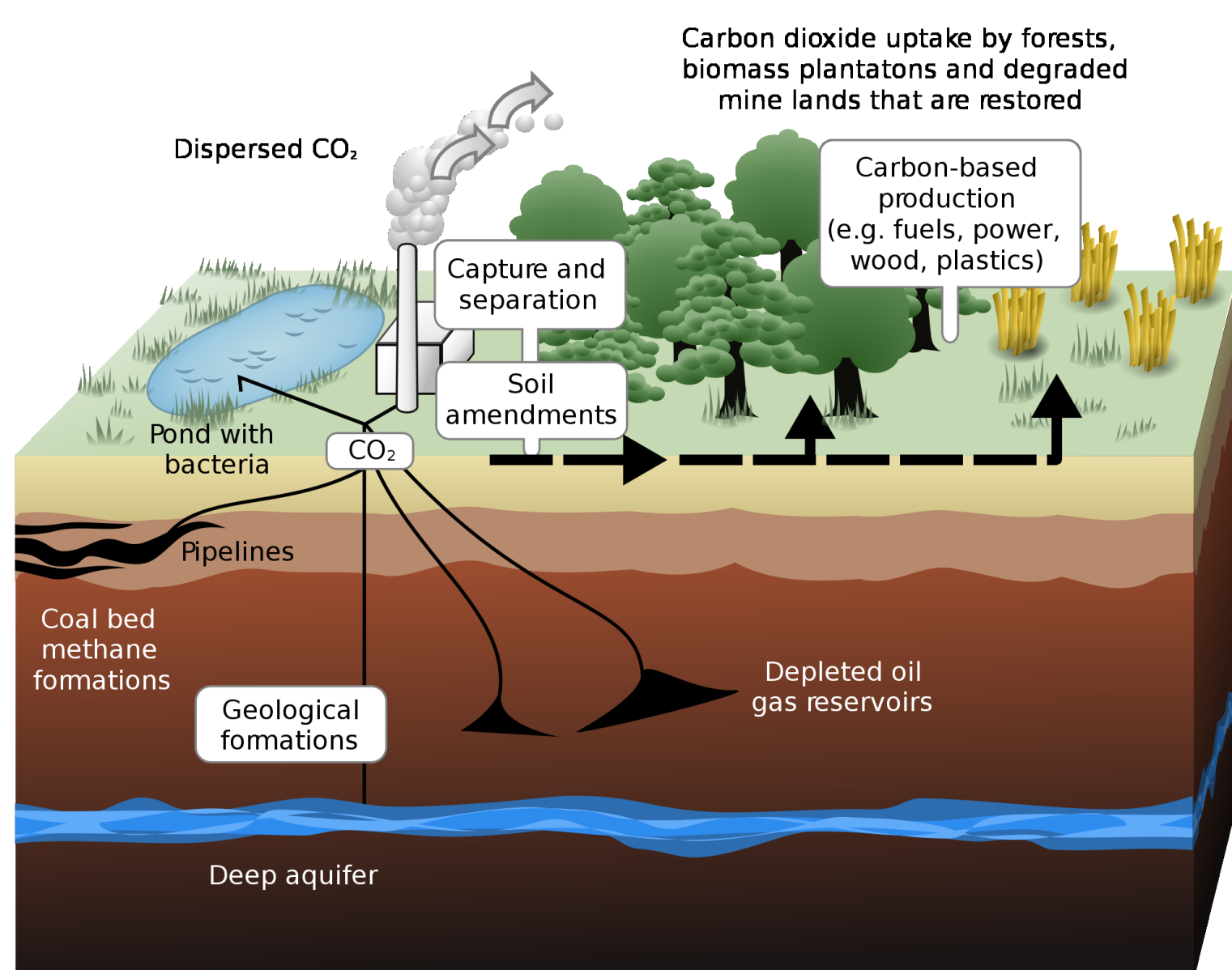
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Question: Do visuals explaining depth of CO₂ injection help a lay audience estimate depth accurately?
Answer: No. Providing visuals does not help and providing them on scale worsens estimates of depth.
Conclusion: Information about depth of injection, if at all, can better be conveyed in text.



Part of FP7 project NearCO₂. Download at <http://www.communicationnearco2.eu> (WP2.1 Report, Chapter 8)

Google 'CO₂ storage' → First Result is Wikipedia



Depth of injection is often visualised such that the CO₂ storage seems close to the surface, e.g. 10 meters rather than 1,000.

Do lay people take such visuals literally? If so, how do these visuals affect lay people's perceptions of CO₂ storage?

Research Questions

- (1) How does precision in indicating the depth in either a text or a visual influence lay people's estimates of injection depth?
- (2) To what extent does estimated depth influence perceived safety and attitudes towards CO₂ injection?

Experimental Design

N = 429

Representative sample of adult population aged 18 - 65 in UK

Online experiment: Stimulus + Questionnaire, 3x3 conditions

Controlled for prior knowledge about CCS

Interaction with processing styles: verbaliser and visualiser scales

Key dependent variable = depth estimate in meters

Textual manipulation of depth indication: Absent / Ambiguous / Precise

What is Carbon Capture and Storage (CCS)?

The purpose of Carbon Capture and Storage (CCS) is to reduce the amount of Carbon Dioxide (CO₂) released to the atmosphere. To achieve this, the CO₂ has to be captured from large sources of CO₂ emissions, for example power stations, and then stored permanently **underground / deep underground / 1,000 meters or deeper underground** under either land or sea.

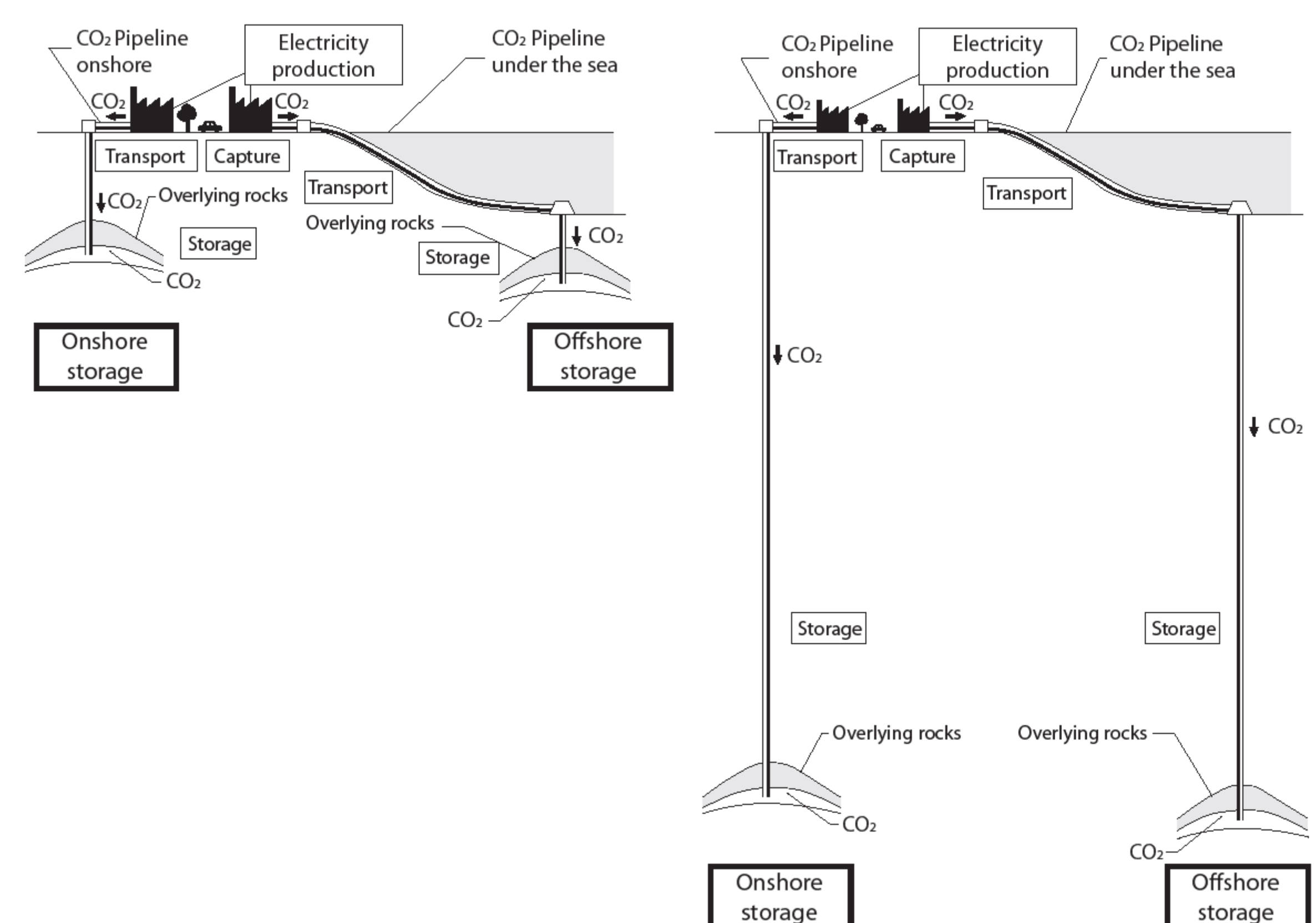
There are three main steps to Carbon Capture and Storage. The first step is to capture the CO₂ that is emitted when burning fossil fuels, for example when coal or gas is burned to produce electricity. The second step is to transport the captured CO₂ to a storage location. The transport system is expected to use pipelines to deliver the CO₂ to the storage site.

The final step is storage. The aim is to store the CO₂ **underground / deep underground / 1,000 meters or deeper underground** permanently, so that it doesn't end up in the atmosphere.

Storage involves injecting the CO₂ into rock **below / deep below / that is 1,000 meters or deeper below** the Earth's surface. It is expected that the overlying rocks will keep the CO₂ safely locked away, in much the same way that oil and gas have been trapped underground for millions of years. Therefore, depleted oil and gas reservoirs provide a possibility for permanent storage.

X

Visual manipulation of depth indication: Absent / Ambiguous / Precise



Results

	Textual indication of depth		
Visual indication of depth	Absent ("underground")	Ambiguous ("deep underground")	Precise ("1,000 meters or deeper underground")
Absent	869	1356	1337
Ambiguous	664	787	1097
Precise	557	837	741

Depth estimates most accurate in text-only conditions and least accurate in visual-only conditions, $F(1,190) = 17.52$, $p < .001$, $Eta Squared = .08$.

Without any indication of depth in either text or visual, lay people's mean estimates of depth are pretty accurate (869 meters)

H1a. The more precise the indication of depth in the text, the better the respondent's estimate of depth, in particular for those respondents who score high on the verbalising scale. **Accepted, but only for respondents who score high on the verbalising scale.**

H1b. The more precise the indication of depth in the visual, the better the respondent's estimate of depth, in particular for those respondents who score high on the visualising scale. **Rejected. The presence of a visual worsens respondents' estimate of depth, and the more precise indication of depth in the visual the worse respondents' estimate of depth. This effect is independent of processing style.**

H2. The deeper respondents estimate the injection, the more positive their attitude towards CCS, the lower risk perceptions of CCS. **Rejected. Respondents' depth estimate of the injection of CO₂ is unrelated to their attitude towards CCS and risk perceptions of CCS. However, a more positive attitude towards CCS is related to less perceived risk.**

