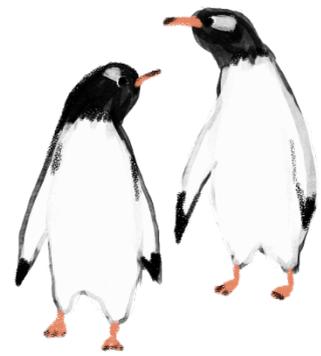


Teaching the Language of Climate Change Science



TEXT ANALYSES: CHAPTER 6 YEARS 3-4

Teachers of Year 3 and 4 students: some language resources included in the text analyses provided here are *not* intended for you to explicitly teach in the class, particularly our use of the verb in passive voice. Passive voice is very useful in scientific writing, and you can use it as part of joint construction of texts so that students become familiar with the grammatical form, without explicitly teaching it at these year levels.

Focus text: What are living things? (p 62)

Structure	Text	Language resources
Question as title Topic sentence introduces both living / non-living Living things + Technical name Two types Characteristics Tell us more: size Examples	<p>What are living things?</p> <p>Some things on earth are living and some are non-living. Living things are also called organisms. Organisms include both animals and plants, and have five characteristics: they grow, move, breathe, reproduce, and can sense things in their environment. Some organisms are so small that they can only be seen through a microscope. Examples of living things – or organisms – are trees, mushrooms, bears, ants and seeds.</p>	<p>Question as title invites the reader to find out more.</p> <p>Modality: ‘some’ organisms: qualified to make it true.</p> <p>‘things’ is a generic everyday term used before the technical term ‘organism’ is introduced.</p> <p>Verbs ‘are’, ‘include’, and ‘have’ are common in definitions where typically one thing equals or belongs to another.</p> <p>‘characteristics’ is a term summarising the attributes of living things.</p> <p>Passive verb ‘be seen’: the viewer is not important.</p> <p>Final sentence has two big noun groups joined in the middle by ‘are’ (Examples of organisms <i>are</i> trees ...seeds.)</p>
Question as title Non-living things Characteristics Examples	<p>What are non-living things?</p> <p>Non-living things do not grow, move, breathe, reproduce or sense things in their environment. Examples of non-living things are rocks, glass, metal, sand, dust, water, and air.</p>	<p>The definition of non-living things is defined by the absence of the five characteristics of living things, using <i>not</i>.</p> <p>This para re-uses the paragraph structure and grammar from previous paragraph for cohesion and consistency.</p>
Question as title. Once-were-living things Characteristics: time scale -Recent with e.g.s -Ancient with e.g.s	<p>What are once-were-living things?</p> <p>Some things used to be living, but are no longer living. Some organisms died or were cut down a short time ago, like timber, bark, olive oil and vegetables in the fridge. Some once-were living organisms died millions of</p>	<p>The words ‘once-were-living’ are acting like a single describing word, thus the use of the hyphens that practically join them together.</p> <p>‘used to be living’: novel verb form signalling ongoing living in the past.</p> <p>‘but’ is a conjunction of contrast (past cf now).</p>

	years ago and have, over time, turned into coal, oil and gas.	<p>'were cut down' is a verb in passive voice: the 'cutter' is not important so is left out..</p> <p>The inference we take from final sentence is that, given the time scale involved, fossil fuels can't be manufactured, are finite and non-renewable)</p>
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Focus text: polar bears (p 66)

Structure	Text	Language resources
<p>Heading (typical of info reports on organisms)</p> <p>Classification (definition) /habitat</p> <p>Indigenous name</p>	<p>Classification and habitat</p> <p>Polar bears (<i>Ursus Maritimus</i>) are mammals that live on the ice and snow above the Arctic Circle. The indigenous peoples of the Arctic, the Inuit, call polar bears 'nanuk'.</p>	<p>Topic sentence defines polar bears with name on one side of 'are' and expanded noun group on the other. Noun group (mammals...) includes its habitat (that live...)</p> <p>Technical terms <i>Ursus Maritimus</i>, (bear of the sea), and 'mammal'</p> <p>Indigenous perspective is also frequent in info reports. (Note extended noun group 'The Indigenous...Inuit'.)</p>
<p>Heading (Appearance) also typically follows Classification.)</p> <p>Feature – function</p> <p>Feature – function</p> <p>Feature – function</p> <p>Feature - function</p>	<p>Appearance</p> <p>Polar bears have large, paddle-like claws that help them to swim to find food, and to spread their weight so they don't fall through the ice. The claws and soft pads provide a good grip for climbing out of the water onto the ice. They have creamy-white fur for camouflage, which helps them to hide in the snow. They have a thick layer of fat under their skin for warmth.</p>	<p>Each of the features or attributes is packaged as a big noun group. The feature appears first (e.g. 'large, paddle-like claws), then information about its function or purpose follows, still as part of the noun group (e.g. that help them to swim... and to find food... and to spread their weight...). Other noun groups include 'where' phrases to tell us where these features are useful.</p> <p>Including all this detail inside a noun group condenses the info into shorter, information-packed sentences.</p> <p>Another grammatical feature is nominalisation, i.e. verbs or adjectives turned into nouns (weight, grip, camouflage, warmth). Also condenses info.</p>
<p>Heading: nominalisation (i.e. verb turned into noun)</p> <p>Topic sentence links to heading.</p> <p>Tell us more about how</p> <p>Tell us more about where.</p>	<p>Hunting behaviour</p> <p>Polar bears feed mainly on seals that swim in the ocean under the ice. They use their camouflage to sneak up on their prey that is sleeping on the ice.</p> <p>Polar bears roam far and wide across the sea ice, searching for food.</p>	<p>Polar bears head the topic sentence. (Note consistency of plural noun for bears.)</p> <p>More expanded noun groups here (eg seals that swimice; prey...ice).</p> <p>Modality: 'mainly' is adverb that makes the statement true.</p> <p>. 'They' is a pronoun referring to polar bears. (Makes para stick together.)</p> <p>Some technical terms: camouflage, prey.</p> <p>Careful choice of verbs in habitual present tense to describe bears' actions: feed, roam, sneak up.</p> <p>Final sentence is complex: second clause begins with -ing, implying 'at the same time'.</p>
<p>Stage 1: denning and birth</p>	<p>Life cycle</p> <p>In winter, a mother bear has her cubs in</p>	<p>The stages of the life cycle often have time phrases or clauses foregrounded: 'In winter, For two months, when summer comes' . .</p>

<p>Stage 2: feeding in den</p> <p>Stage 3: leaves the den</p>	<p>a den under the snow. They are kept warm by her thick fur. For two months they feed on milk made from the mother's fat. They leave the den together to hunt for food when summer comes.</p>	<p>Circumstances or phrases can be moved around in sentences. As well as 'when' phrases, 'where' phrases are evident (in a den, under the snow); 'from what' phrases (from the mother's fat), 'how' phrases (by her thick fur). 'they' refers to the cubs in subsequent sentences after the topic sentence, and helps the para to stick together. .</p> <p>Final sentence is complex with 3 clauses: second one begins with 'to': clause of purpose; third one begins with 'when': clause of time.</p>
<p>Heading: nominalisation: risk and melting sea ice.</p> <p>Reason for risk.</p> <p>Implications for polar bears.</p> <p>Tell us more.</p> <p>Possible final outcome</p>	<p>Risk from melting sea ice</p> <p>Because the Earth is warming, the sea ice in the Arctic forms much later each winter and melts earlier in spring. For this reason, the polar bears' hunting season is getting shorter. As the ice disappears, the bears are going hungry because they can't walk over the sea ice to find their prey. Polar bears might disappear from the Arctic.</p>	<p>'Because the Earth is warming' is foregrounded because it is crucial information. 'For this reason,' is a connector that links to 'because' in previous sentence.</p> <p>Expanded noun groups condense meaning (e.g. the sea ice in the Arctic; polar bears' hunting season). 'is getting' is a continuous present verb. 'shorter' compares the length of hunting season now that the Earth is warming to before the warming.</p> <p>Second last sentence is complex: begins with 'when' (As the ice disappears..) and finishes with 'why' (because they can't walk ...)' Use of 'might' in final sentence, along with drastic 'disappear' raises this event as possible.</p>
<p>Heading</p> <p>Topic sentence provides general action and why</p> <p>More specific action</p> <p>Examples of actions</p>	<p>How humans can help</p> <p>Humans everywhere can help polar bears by using fewer of the Earth's resources so that the Earth is not heating up as fast. We can reduce, re-use and recycle. That means driving less, having shorter showers, buying less, and buying local when we can.</p>	<p>'can' offers the reader (who is included in 'humans everywhere') the option to act.</p> <p>The first sentence is complex: the second clause begins with 'by...' to tell us how. The third clause begins with 'so that...', telling the reader the outcome or consequence.</p> <p>The rest of the paragraph is a list of actions, so the action verbs are very important. Just what we should reduce, reuse and recycle, and what we are buying local are left out: the writer assumes that the reader will know this.</p>

Focus text: the Earth (p 70)

Structure	Text	Language resources
<p>Definition</p> <p>Tell us more: revolution</p> <p>Tell us more: source of energy</p> <p>Tell us more: rotation</p>	<p>The Earth is a spherical planet in space that revolves around the sun. (This is the Earth's revolution around the Sun.) The sun is the source of most of Earth's energy, providing heat and light. While the Earth is revolving around the Sun, it also rotates on its own axis. (This is the Earth's rotation.)</p>	<p>Capitalisation of Earth and Sun as proper nouns. Definition made up of the thing on one side of 'is' and a big noun group on the other (a spherical planet...)</p> <p>'This' is pronoun that links back to the verb 'revolves'. This sentence turns the verb 'revolves' into noun 'revolution': nominalisation.</p> <p>The sun... is complex sentence. Second clause begins with 'providing...'</p> <p>'While' sentence is also complex. Tells us two actions happening at the same time.</p> <p>'This' sentence turns verb 'rotates' into nominalisation 'rotation'.</p>

<p>Question as heading</p> <p>Topic sentence: first material.</p> <p>Second material</p> <p>Physical features: poles (named)</p> <p>Material at the poles.</p> <p>Arctic materials</p> <p>Antarctic materials</p>	<p>What is the Earth's surface made of?</p> <p>The Earth's surface is mostly made up of water. The remainder is land. At the top and bottom of Earth are the poles: the Arctic in the north, and the Antarctic in the south. The poles are made up of ice. The ice at the Arctic is mostly sea ice (formed on top of the ocean). The ice in the Antarctic is land ice (formed on top of rock).</p>	<p>'The Earth's surface' is the topic of the paragraph and so goes in theme position. 'top' and 'bottom' are terms that, while approximate, are sufficient to begin learning about the poles.</p> <p>Many sentences use verb 'are made up of...' to mirror the words in the heading. Repetition adds to cohesion.</p> <p>Use of brackets to reword and add meaning : 'sea ice (formed on top of the ocean).</p> <p>Ellipsis: words left out when not needed to condense meaning: 'The remainder (of what?) is land.</p>
<p>Heading</p> <p>Topic sentence</p> <p>Gas 1 and why it's important</p> <p>Other gases and their function</p> <p>More about their function</p> <p>Group name of these gases</p> <p>More about atmosphere</p>	<p>The atmosphere</p> <p>The air around us is the Earth's atmosphere, made up of different gases.</p> <p>The most important gas for living things is oxygen, because without it, they would not survive. The atmosphere has other gases that help keep the Earth warm. They act like a greenhouse or like the windscreen of a car out in the sun, keeping the sun's warmth trapped in our atmosphere, and are called greenhouse gases. Air in the atmosphere moves around the planet from one place to the next.</p>	<p>First sentence is definition: 'air' on one side of 'is', and an expanded noun group on the other side.</p> <p>'the most important gas..' links back to 'different gases' in previous sentence, and forward to 'oxygen', elaborated with 'why' clause beginning with 'because...' (complex sentence).</p> <p>'Atmosphere' sentence is similar: begins with definition: 'atmosphere' on one side of 'has' and expanded noun group on the other (other gases that...).</p> <p>'They' is pronoun referring to gases (cohesion). Action is elaborated with two 'how' phrases: 'like a greenhouse...', 'like a windscreen'. 'keeping...' is extra clause telling us more about how they are similar to greenhouse.</p> <p>Final sentence implies the importance because we all breathe the same air, wherever we are on Earth. We are all influenced by what happens around the globe.</p>
<p>Heading</p> <p>Interconnection</p> <p>Tell us how</p> <p>Tell us why</p>	<p>The oceans</p> <p>The oceans around Earth are interconnected. Warm water near the Equator moves to cool water at the poles and back again, keeping everything in balance (NASA 2020).</p>	<p>Topic sentence gives message about interconnectedness of the oceans. (implied in paragraph about atmosphere. Explicitly stated here.)</p> <p>Expanded noun groups place water at different parts of the Earth: 'Warm water near the Equator' etc.</p> <p>Final clause 'keeping...' tells us the effect of this movement (matches grammar in previous paragraph: repetition adds to cohesion).</p>
<p>Heading</p> <p>Topic sentence</p> <p>One example of a change and problem</p>	<p>How humans affect the Earth</p> <p>When humans make changes to the Earth, there are consequences for all living things.</p> <p>Sealed surfaces such as bitumen are not viable habitats for living things. Rain cannot</p>	<p>Title uses 'affect': first sentence uses 'make changes'. These are 'meaning chains: add to cohesion, i.e. making text stick together.</p> <p>Technical terms: 'consequences', 'viable habitats'</p> <p>'Rain' sentence' is complex: cause and effect using conjunction 'so'</p>

Tell us more about the problem	soak into some surfaces, like bitumen or bare earth, so living things can't use it. Instead, rain runs into drains and out to sea.	Expanded noun groups to condense meaning 'some surfaces, like bitumen...' 'Instead' is a connector to signal alternative action.
Impact of change	These changes that humans are making	'These changes that...' is a noun group with pronoun 'these', referring to the entire paragraph above. 'changes' are further described by
How we have to help	protect Earth by acting thoughtfully and carefully whenever we use Earth's	Modality is strong: 'all living things', 'have to protect...' 'whenever we use...'
More about how we have to help	resources. We have to reduce, re-use and recycle to conserve the Earth's resources.	'By acting...' is dependent clause telling us 'how' to protect (Complex sentence) '...to conserve...' is dependent clause of purpose (complex sentence)

Focus text: materials and their changing forms (p 75)

Structure	Text	Language resources
Heading	Materials and their states	
Definition and scientific rewording	Every object in the world is made of 'stuff'. Scientists call them 'materials'. Materials take different forms.	Powered down term 'stuff' is followed by scientific powered up term 'materials'. (Similarly forms – states.)
Material forms and scientific rewording	Scientists call forms 'states'. <i>Solid</i> materials (solids) keep their shape unless cut or broken. Rocks and glass	Use of italics for emphasis, and brackets to add additional, colloquial term.
Behaviour of solids and examples	are examples of solids.	Difference between solids and liquids described by their behaviour (verbs such cut, broken, flow, take the shape)
Behaviour of liquids and examples	<i>Liquid</i> materials (liquids) flow and take the shape of their container. Water and oil are examples of liquids.	
Topic sentence: heat	Materials can change state	Topic sentence is complex: 'by' clause tells us 'how'. Grammatical structure of rest of paragraph is repeated:
Heat added	Materials can change state by adding or removing heat. When heat is added to a solid, it becomes a liquid. This process is called melting. When ice melts it	<ul style="list-style-type: none"> • General 'when' clause – • 'this process' names result. • Specific 'when' clause provides example.
Name of process	becomes a liquid: water. When heat is removed from	
Example of process	a liquid, it becomes a solid. This process is called	
Heat removed	freezing. Water in a freezer turns to ice.	'liquid: water' - Colon: is used as substitute for 'namely' or 'more information'.
Name of process		
Example of process		
Heading: specific example of changes in states of matter.	Melting ice in the poles	"where phrases' foregrounded to tell us where these changes in state are happening.
Change in state and effect	In the Antarctic and Greenland, ice caps are melting from higher temperatures, causing a rise in sea level and flooding. To stop flooding, we have to keep the	Clause beginning with 'causing' makes sentence complex, signifies cause and effect.
How to reverse change of state	ice at the ice caps from melting.	To stop flooding: another dependent clause foregrounded at front of sentence, signifies purpose.

Investigative report: how melting ice affects sea levels (p 77)

Structure	Text	Language resources
Heading Goal	Aim To test how the melting of sea ice and land ice affect sea-levels	Not a complete sentence: dependent clause of purpose (implied continuation of heading, i.e. 'The aim is to test...')
Heading List of materials	Materials <ul style="list-style-type: none"> • two clear containers of equal size to represent the poles • one wooden block or rock representing land at the Antarctic • two large blocks of ice of equal size • water 	Slightly technical term 'materials' instead of more spoken like 'what you need'. List consisting of expanded noun groups, which contain all specific requirements sufficient to make the demonstration a success.
Heading Step 1 Step 2 Step 3 Step 4	Procedure 1 Set up the containers. Label one Arctic and the other Antarctic 2 The Arctic has no rock. Pour in water until it fills about a third of the container. Place a large ice-block in the water and mark the water level. Measure the height of the water. 3 Now for the Antarctic. Place a rock with a flat surface in the container to represent land. Pour in water until it is at the same height as the Arctic. (Make sure the top of the rock is not underwater). Mark the water level. Put a large ice-block on top of the rock to represent land ice. 4 As the ice melts, observe and mark the change in the water level in each container.	Each step begins with the verb in theme position: they are in the imperative, i.e. giving orders. Each sentence includes the 'things' or the objects or materials that are acted on: container, rock, ice-block, etc. Each sentence contains strings of phrases such that anyone who reads the instructions will be successful: 'where': in the container, at the same height, on top of the rock. Some sentences contain additional clauses so that the follower understands the conditions needed: 'until it fills about one third...', 'as the ice melts'; or the purpose of the action 'to represent land ice'; Note that there are no personal pronouns in these instructions. This makes it sound more objective and authoritative.
Outcomes (usually in table form)	Results Table 6.6 Sea level over time with melting sea ice and land ice	Apart from succinct headings, the results here are quantitative, i.e. numbers, representing millimetres of sea level rise.

Discussion	Findings	
Observation in Arctic Reason	The height of the sea water in the Arctic did not change as the ice melted. This was because the ice was already floating in the ocean. When it melted, it changed state from a solid to a liquid, but did not add new water to the ocean.	Expanded noun groups with nominalisations 'The height of the sea water in the Arctic' (high changed to 'height') for density of language 'This' in next sentence refers back to the <u>process</u> in sentence 1, <i>not</i> to a <u>thing</u> .
Elaboration with changes in states of matter		
Observation in Antarctic Reason	In the example (Table 6.6), the height of the sea water in the Antarctic was 4mm higher after the land ice melted. This increase in height is important. The increase was because the ice was on the rock, and when it changed state from a solid to a liquid, it flowed into the ocean.	Further nominalisation: 'increase in height' (<i>not</i> 'it got bigger').
Elaboration with changes in states of matter	Therefore, melting sea ice does not cause the sea level to rise, but melting land ice does.	This increase: pronoun referring back to data in previous sentence. Therefore: connector often used to draw a conclusion. Means 'in this way'...
Conclusion		

Focus text: heat transfer (p 79)

Structure	Text	Language resources
Question as heading Definition of Earth's energy by source Elaboration: forms as it reaches the Earth.	What is heat? Almost all of Earth's energy comes from the sun. It reaches the Earth as heat and light.	Modality: 'almost all' to make the statement true. 'It' is pronoun referring back to 'energy'. 'As heat and light' tells us 'how', i.e. the form it takes to reach the Earth. (very important: heat and light <i>are</i> energy.
Heading Topic sentence: direction of heat transfer Example 1 Example 2	Heat transfer Heat energy transfers from a warm object to a cool object. For example, ice frozen in a plastic bottle melts on a hot day when the heat from the warm air around the bottle is transferred through the plastic and into the ice. A warm hand transfers heat to a frozen ice block, causing it to melt.	Transfer used as a nominalisation: heat transfer, and a verb 'heat energy transfers..'. 'Where' phrases very important: show the direction of transfer. For example is connector linking this sentence to previous sentence. Expanded noun groups including inside them 'where' and 'when' phrases to identify circumstances under which this process of heat transfer takes place e.g. 'heat from the warm air around the bottle'. Final sentence is complex: second clause begins with 'causing' signalling cause and effect.
Heading Definition of insulators	Insulation in our home Insulators are materials that do not transfer	'Insulation' is nominalisation from 'insulate' First sentence is definition: 'thing' on one side of 'are', and the expanded

<p>Function Use</p>	<p>heat easily. They keep heat in or out. They are used for insulation in our homes.</p>	<p>noun group on the other side as the definition. 'They' refers to insulators. 'Are used' is verb in passive voice: the 'user' is not specified because it's not important.</p>
<p>Heading</p> <p>Specific material as insulator: air</p> <p>Example 1</p> <p>Example 2 with reason (because)</p> <p>Example 3 with purpose (to)</p> <p>Example 4 with reason (because)</p> <p>Elaboration of reason</p>	<p>Air is an insulator</p> <p>Many materials that are good insulators use air. An esky uses polystyrene to insulate food or drinks. A woollen jumper keeps us warm because it traps warm air next to our skin.</p> <p>Insulating batts with air are used in the walls and roof spaces of houses to help keep them warm in winter and cool in summer.</p> <p>The atmosphere is a good insulator, because it is made of air. It keeps the Earth not too hot and not too cold.</p>	<p>The topic sentence links to previous paragraph, and to heading, with use of the word 'insulator'. It introduces one insulator: air.</p> <p>Each subsequent sentence provides an example of insulators using air, and is a complex sentence.</p> <p>Either:</p> <p>Function in first clause + reason in second clause (using 'because...')</p> <p>OR</p> <p>Function in first clause + purpose in second clause (using 'to...')</p>
<p>Heading</p> <p>Topic sentence</p> <p>Stage 1 of greenhouse gases</p> <p>Stage 2</p> <p>Stage 3</p> <p>Problem with this effect</p> <p>How we solve this problem</p>	<p>How greenhouse gases insulate the Earth</p> <p>Greenhouse gases rise up into the atmosphere and stay there. They act like a blanket, trapping heat in the atmosphere.</p> <p>Some of the heat is absorbed by the land, but most is absorbed by the ocean. Scientists are warning us that too much heat is now being trapped by greenhouse gases. The best way to solve this problem is to stop using fossil fuels.</p>	<p>This is a mini-factorial explanation (if you care!) .</p> <p>Stage 1 consists of two actions: rising up, and staying.</p> <p>Stage 2 is how they act when they get there. This stage uses a simile 'like a blanket' and elaborates with an additional clause 'trapping...' elaborate on its effect.</p> <p>Stage 3 uses passive voice for the verb 'is absorbed...': it is absorbed by both land and ocean. We know what is doing the absorbing, but Using passive voice like this enables us to put 'heat' as the topic of the sentence.</p> <p>'Are warning' and 'being trapped' are in present continuous tense. This tells us that these actions are ongoing and happening now.</p>