Thinking as orientation

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Drawing on Dewey's 1910 book "How we think" I argue that while the roots of thought (or cognition) lie in the ability of animals to orientate themselves, and that these roots are clear in the way that Dewey characterised thinking, speech, a social competence, vastly energises and better organises thinking.

In December 2019 Australian Education Ministers issued a declaration setting out their vision for education in Australia. The declaration states that "Australian Governments commit to working in collaboration with the education community to support all young Australians to become… successful lifelong learners who…

• engage in respectful debate on a diverse range of views

• are able to think deeply and logically, and obtain and evaluate evidence as the result of studying fundamental disciplines

• are able to make sense of their world and think about how things have become the way they are" (Education Council 2019 p.5).

These ambitious commitments raise significant questions including: what is thinking and how can it be taught? In this paper I argue that thinking is orientation. Thought and speech are distinct, but speech can significantly energise thought.

What is thinking? Thinking as Orientation

Taken in its broadest sense (as cognition) thinking can be seen as *orientation*.

Sperber and Mercier identified a basic property common to all cognition that it is primarily a means for organisms that are mobile to respond appropriately to risks and opportunities presented by their environment. Cognition didn't evolve in immobile plants but in mobile animals. Cognition without mobility (in plants or in immobile animals such as corals) would be wasteful. Mobility without cognition would be fatal (Sperber and Mercier 2017 p. 53)

Cognition involves organisms being able to orientate themselves to respond appropriately to risks and opportunities.

David Barrie identifies many examples of feats of animal navigation. Most mobile organisms are able to think insofar as they are able to orientate themselves in physical space, moving themselves towards things they need and away from danger. Animals orientate themselves using a variety of mechanisms including:

- vision; polarisation of sunlight; moonlight; starlight;

- smell;

- sound;

- Earth's magnetism;

- circadian clocks and internal maps.

Dung beetles can roll a ball of cow dung in a straight line at night, over rough terrain, using the moon as a reference point, or on moonless nights, the Milky Way Galaxy to orientate themselves! On cloudy nights they are disorientated (Barrie, 2019)

Honey bees are able to orientate themselves to food sources via communication with scouts. Karl von Frisch discovered that scout honeybees conveyed accurate information to its nest mates about a remote food source, its location (bearing and distance) using a figure eight dance. The scouts' dance is a symbolic activity in which the direction of the food source and the distance to it is conveyed to hive mates (Barrie 2019).

Sperber and Mercier 2017 (p56) note that cognition as orientation "involves going well beyond the information available to the senses. To integrate this information, to identify the events in the environment that have caused these sensory stimulations, to respond in an appropriate manner to these events, cognition must, to a large extent, consist in drawing inferences about the way things are, about what to expect, and about what to do".

Reflective Thought as Orientation

In his 1910 book *How We Think* the great American philosopher and educator John Dewey argued that thinking involves "the suggestion of a conclusion for acceptance, and also search or inquiry to test the value of the suggestion before finally accepting it" (Dewey 1910 p.30). He notes

that "Reflection involves not simply a sequence of ideas, but a *con*sequence – a consecutive ordering in such a way that each determines the next as its proper outcome, while each in turn leans back on its predecessor" (Dewey 1910 p.2-3)

Dewey identified five logically distinct steps in reflection – or in an inquiry:

(i)   a felt difficulty;
(ii)   its location and definition;
(iii)   suggestion of possible solution;
(iv)   development by reasoning of the bearings of the suggestion;
(v)   further observation and experiment leading to its acceptance or rejection; that is, the conclusion of belief or disbelief. (Dewey 1910 p.72)

It is interesting that Dewey uses spatial terms and terms associated with orientation in space to characterise the process of reflective thinking.

Dewey claims that "the origin of thinking is some perplexity, confusion, or doubt" (p.12). "Reflective thinking means judgment suspended during further inquiry; and suspense is likely to be somewhat painful." (p.13) This state of perplexity could also be described as a state of *disorientation*. If we feel disorientated, the best strategy is not to rush to a resolution, but to stop to try to gather one's *bearings*.

Under the heading "Finding one's way an illustration of reflection" Dewey makes the connection between orientation in physical space and reflective thinking very clear. He writes "The perplexed wayfarer must carefully scrutinise what is before him and he must cudgel his memory. He looks for evidence that will support belief in favour of either roads – for evidence that will weight down one suggestion. He may climb a tree; he may go first in this direction, then in that, looking, in either case, for signs, clues, indications. He wants something in the nature of a signboard or a map, and *his reflection is aimed at the discovery of facts that will serve this purpose*…Thinking begins in what may fairly enough be called a *forked-road* situation, a situation which is ambiguous, which presents a dilemma, which proposes alternatives" (Dewey 1910 p. 10-11 Dewey's emphasis).

It is interesting that Dewey uses terms associated with orientation in space to characterise the process of reflective thinking, for example 'location' in step ii and 'bearings' in step iv. We have seen that

navigation is a fundamental cognitive affordance of all animals that live on the move (Barrie 2019), In humans, our ability to orientate ourselves generally may be modelled on our ability to orientate ourselves in physical space. We talk of a *path* of reasoning, taking a *position,* a conclusion *following* from premises, the *flow* of an argument, a logical *dead end,* a *line* of argument, an argument having a number of *steps*, an inductive/deductive *movement,* a *circular* argument.

Dewey himself describes at some length these spatial metaphors. He writes "The importance of connections binding isolated items into a coherent single whole is embodied in all the phrases that denote the relation of premises and conclusions to each other. (1) The premises are called *grounds, foundations, bases*, and are said to *underlie, uphold*, *support* the conclusion. (2) We "*descend*" from the premises to the conclusion, and "*ascend*" or "*mount*" in the opposite direction—as a *river may be continuously traced from source to sea or vice versa*. So the conclusion *springs, flows, or is drawn* from its premises. (3) The conclusion—as the word itself implies—*closes, shuts in, locks up together* the various factors stated in the premises. We say that the premises "*contain*" the conclusion, and that the conclusion "*contains*" the premises, thereby marking our sense of the inclusive and comprehensive unity in which the *elements* of reasoning are *bound tightly together*".

Dewey on Language and Thought

In *How We Think,* Dewey discusses the relationship between thought and language. He notes speech has a "peculiarly intimate connection with thought" (p. 170)

Dewey rejects the view that "words are the garb or clothing of thought, necessary not for thought but only for conveying it" (p. 170) in favour of the view that "while language is not thought it is necessary for thinking as well as for its communication" (p.170)

It is not clear, however, that language is necessary for all thought, or cognition. Most mobile organisms are able to think insofar as they are able to orientate themselves in physical space, moving themselves towards things they need and away from danger.

The cognitive challenge of orientating oneself in physical space does not require language, though the bee's dance is perhaps close to a language.

Dewey writes "Thought deals not with bare things, but with their meanings, their suggestions; and meanings, in order to be apprehended, must be embodied in sensible and particular existences" (Dewey 1910 p.171) broadly speaking, language.

It is not at all clear that all thinking needs to be covert and that voiceless animals (or humans for that matter) are not able to engage in our equivalent of "thinking out loud" for example by manipulating physical objects (bare things) rather than thoughts.

As Gilbert Ryle observed, we do not reserve the title 'thinking' for inner processes. An architect can think out her plan while manipulating toy bricks as can a sculptor plan a statue in marble by modelling a piece of plasticine. Additional labours might be necessary to put these plans into words". (Tanney, 2015) In general, thinking should not be equated with using language. The mark of the mental is not its covertness or internality. It is the kind of activity engaged in - problem solving, creativity, criticism - whether overtly or covertly expressed. Thought – understood enactively as action in the world – comes first and internalised action or internalized speech follows it much later.

Wolfgang Kohler found that chimpanzees stacked boxes and then climbed up on them to access food hanging out of reach. These apes may be fairly described as doing the equivalent of our "thinking out loud" or "thinking with our hands".

Solving Rubik's cube does not, in any obvious way, involve the manipulation of ideas beyond the manipulation of the cube itself. Dewey's own example of the perplexed wayfarer does not involve manipulation of ideas beyond climbing trees and walking along diverging roads looking for landmarks. These reasoned navigational skills would not be beyond even a deaf and speechless wayfarer.

What Peter Godfrey-Smith (2017) describes as the "mischief and craft" in the behaviour of octopuses in laboratories in adapting to their unusual situation, and their curious engagement with their captors, seems again to involve their equivalent of our "thinking out loud". Godfrey-Smith aptly describes their behaviour as being curious, flexible, adventurous and opportunistic – all characteristics of thought – but all enacted without the benefit of speech.

Vygotsky (2012) found that

1. Thought and speech have different genetic roots.

2. The two functions develop along different lines and independently of each other.

3. There is no clear-cut and constant correlation between [thought and speech] in phylogenesis….In the phylogeny of thought and speech, a prelinguistic phase in the development of thought and a preintellectual phase in the development of speech are clearly discernible.

Reflective thinking involving the manipulation of ideas may be based on our ability to orientate ourselves in space. It is significant that the parts of the human brain that support geographical navigation may also be involved in conceptual navigation. Activities such as geographical navigation, conducting a conversation, managing social relationships, making decisions, manipulating ideas and creativity involve the hippocampus. The characteristic patterns of firing found in the grid-cells that support map-like representations of space also appear when we perform an abstract cognitive task that has nothing to do with navigation. (Barrie 2019)

This chapter is concerned with the features of animal cognition. It might be asked about the relevance of the features of thinking in non-linguistic animals to thinking in linguistically-abled humans. One answer is that humans are animals too and have inherited the cognitive capabilities of our non-human ancestors. Pre-linguistic systems of thinking interact with our linguistic capabilities. Our linguistic abilities enhance, but do not replace the inferential capabilities of our non-human animal relatives.

To manipulate, analyse and synthesise ideas, and the words that carry them, a thinker first needs to remember them. Memory of words may well be facilitated by memory of spaces. Luria describes the extraordinary memory of a man whom he code-names S. and whom he worked with over many years. Luria writes that:

> on his first meeting S. was a newspaper reporter who had come to my laboratory at the suggestion of the paper's editor. Each morning the editor would meet with the staff and hand out assignments for the day—lists of places he wanted covered, information to be obtained in each. The list of addresses and instructions was usually fairly long, and the editor noted with some surprise that S. never took any notes. He was about to reproach the reporter for being inattentive when, at his urging, S. repeated the entire assignment word for word. (Luria, 1968, pp. 7-8)

Luria discovered that

> when S. read or heard a long series of words each word would elicit a graphic image… [and] he would "distribute" them along some roadway or street he visualized in his mind… Frequently he would take a mental walk along that street and slowly make his way down, "distributing" his images at houses, gates, and store windows. (Luria, 1968, pp. 31-32)

To recall the words he heard, he would simply begin his walk, either from the beginning or from the end of the street, find the image of the object he had named, and "take a look at" whatever happened to be situated on either side of it. (Luria, 1968, p. 33)

S. was able to recall strings of words by dropping off and picking up graphic representations of these words in a virtual representation of a place S. knew intimately from regular walks.

Not everyone has the capacity to distribute and collect words placed along a familiar street, but many can learn to construct a memory palaces that involves making a journey through a place one knows well, such as a building or a street. Along that journey there are specific locations that you always visit in the same order.

According to Kelly, memory in oral traditions such as Australian Aboriginal people, is facilitated by interactions between the landscape (the land/country) and ritualized *song lines*. Song lines are navigational tracks - elders sing the landscape and move from location to location through it and teach each other through song. At each sacred site within the sung track they perform rituals - repeated songs – and thereby encode the information. Song lines link positions in landscape so that each location in the landscape serves as a mnemonic - a memory aid - to a particular part of the information system so that the knowledge is literally grounded in the landscape. Aboriginal people do not need to be walking the song line to remember. The song lines become internalised. (Kelly 2016)

While speech (whether covert or overt) may not be necessary for complex thought, it does provide a useful and flexible medium for the organisation and manipulation of ideas. Speech, saying things and hearing them, plays an important organizational role of helping us to combine ideas, draw attention to things, and properly sequence ideas (Godfrey-Smith 2017).

Dewey notes that "Speech forms are our great carriers: the easy-running vehicles by which meanings are transported from experiences that no longer concern us to those that are as yet dark and dubious". He adds "*The chief intellectual classifications that constitute the working capital of thought have been built up for us by our mother tongue*" (Dewey 1910 p. 175 Dewey's emphasis).

Dewey notes that "language connects and organizes meanings as well as selects and fixes them" (Dewey 1910 p. 185). He notes the contextual nature of meaning. "As every meaning is set in the context of some situation, so every word in concrete use belongs to some sentence and the sentence, in turn, belongs to some larger story, description, or reasoning process" (Dewey 1910 p. 185). Speech serves as a framework or a scaffold for thought.

Peter Godfrey-Smith suggests a mechanism for how speech might enhance thought. He claims that speech functions both as input and as output in a feedback loop – he calls it an efferent copy system. In speech, the creation of an auditory input enables you to compare your spoken words to an inner sound of them. As we say things to ourselves or out loud, we also register, internally, the sounds of what we meant to say.

When we hear – internally- how words connect, we learn how the corresponding ideas cohere. As Dewey noted we can put things in order, bring possibilities together. Speech (whether covert or overt) enables us to put ideas in the right order or experiment with different combinations of ideas.

What Dewey calls 'Reflective thinking' is a form of what Daniel Kahneman characterises as slow thinking – or System 2 - that "allocates attention to effortful mental activities that demand it, including complex computations. The operations of System 2 are often associated with the subjective experience of agency, choice and concentration. This contrasts with fast thinking – or System 1 – that "operates automatically and quickly, with little or no effort and no sense of voluntary control". (Kahneman 2011 p.20-21)

Godfrey-Smith suggests that speech facilitates System 2 thinking – that tries to be impartial – looking at all sides of an argument. Speech, whether overt or covert is a way of walking through the consequences of

ideas. Covert or overt speech is apparently one mechanism that enables complex thought in us.

Children's understanding of logical syllogisms would be assisted by an understanding the meaning of words denoting logical connectives such as "either…or….", "Both…and", "If…then…", "not", and "therefore".

Consecutiveness of Language

Dewey notes some ways in which school practices may interrupt consecutiveness of language and thereby systematic reflection. Dewey writes "Teachers have a habit of monopolizing continued discourse. Many, if not most, instructors would be surprised if informed at the end of the day of the amount of time they have talked as compared with any pupil. Children's conversation is often confined to answering questions in brief phrases, or in single disconnected sentences. Expatiation and explanation are reserved for the teacher, who often admits any hint at an answer on the part of the pupil, and then amplifies what he supposes the child must have meant. The habits of sporadic and fragmentary discourse thus promoted have inevitably a disintegrating intellectual influence" (Dewey 1910 p. 185-186).

Dewey identifies other school practices that interrupt systematic reflection including assignment of too short lesson accompanied by minute "analytic" questioning, and "insistence upon avoiding error instead of attainment of power" (Dewey 1910 p. 186).

Over a century later John Hattie expressed similar concerns to Dewey that "Classrooms are dominated by teacher talk" and the need for "far less talk and much more listening" (Hattie 2012 p. 109) Hattie notes (p.109) that this is not how teachers perceive what happens in their classroom. Hattie writes that 'Interaction' for many teachers means checking that students are listening. Student responses are "brief, reactionary, and certainly rarely conversational. Mistakes are so often seen as embarrassing, and teachers strive to minimise public errors..." (p. 112)

Hattie suggests that the more important task for teachers is to listen and listening, in turn, needs dialogue. It appears that Dewey would agree. School practices that support consecutiveness of language and thereby systematic reflection would involve teachers giving up the habit of monopolizing discussion to achieve a better balance between teacher

and student talk. Children could be encouraged to elaborate on and explain ideas, promoting dialogue.

What would school practices that support systematic reflection look like? With the benefit of a century of hindsight and experience, Hattie, citing Robin Alexander (2008), describes the dialogic classroom in which students ask questions and comment on ideas.

> The essential features are defined as: collective (doing learning tasks together); reciprocal (listening to each other, sharing ideas, considering alternatives); supportive (exploring ideas with no fear of negative repercussion from making errors); cumulative (building on own and others' ideas); and purposeful (teachers plan with clear learning intentions and success criteria in mind) (Hattie 2012 p. 112)

Hattie mentions an important benefit of the dialogic classroom that "teachers can learn so much about their effect on student learning by listening to students thinking aloud" (Hattie 2012 p. 112). In the dialogic classroom teachers do not give up their authority to students. Teachers still plan lessons and elicit rich feedback from students about the effect of their teaching.

Conclusion

In this paper I have argued that thought (or cognition) is orientation – finding one's way in the world. Thought is distinct from speech or even internalised action. Thought is often manifest externally. We can think out loud or through our action in the world. On the other hand, speech can enhance and energise our thought. It can facilitate the organisation of thought and connecting our ideas.

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