A perspective on 'thinking' (and why it is important for metacognition)

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Thank you for listening to this episode on the Metacognition Channel. Before I get into the main content of this episode, I'd like to draw your attention again to a few of the reasons for this podcast.

Firstly, it is about metacognition and how we can come to know about and understand metacognition. Secondly, the podcast is meant for a diverse audience, and I'm going to keep it as non-technical as I can so that the information I present is as accessible to and resonates with as many people as possible. Thirdly, my attention will be most often on metacognition as it relates to education and teaching and learning at multiple levels, and this is because, again, I want to produce a podcast that is as relevant and meaningful to as many persons as possible across education, and for the public.

Those points being so, I'd like to begin this episode with a little memory exercise for us to do. I want you to think back to your experiences in school, or in any educational setting if that works better for you, or in your life in general…maybe at work or at home, and ask yourself if these sentences have ever been said to you, or if you've heard them being said to someone else. Here are the sentences: "What do you think?" "I'd like you to think about that." You need to think about that some more." "You need to think harder." "You're not thinking hard enough." "You need to change your thinking about that." and, "Is that what you really think?"

I would be very surprised if you had not experienced having heard those statements or queries, either to yourself or another person, or maybe a group of people. They are language and statements that are common across educational settings. The use of language in this way regarding thinking is very taken-for-granted, very taken-for-granted, to the extent that we usually never question such language and its use.

The word 'think' is common amongst these statements and queries, as you will have noticed. So, why might I be drawing your attention to this common, every day, and taken-for-granted use of the word 'think?' I'll give you around 10 seconds to 'think' about that.

Because you're not sitting in front of me, either in person or virtually by teleconference, let me get to the point. The reason I asked you, "Why might I be drawing your attention to this common, every day, and taken-for-granted use of the word 'think'?" goes back to the definition of metacognition that I choose to use, that is, 'Metacognition is one's knowledge, control, and awareness of their thinking and learning processes.' I could also suggest, as I have in the past, that it includes our knowledge of how others think. However, for today's purposes I will limit my consideration of metacognition to what we know about our personal thinking and learning processes, and our awareness and control of those.

One of the characteristics of most, if not all definitions and constructs of metacognition is the knowledge component. In other words, "What do we know about how we think and learn?" And, underlying these matters is our personal knowledge of what it means to think. Surely, if this word is used so widely and with such authority in classrooms and other educational and everyday settings, we should have a generally agreed upon notion of what it means to think. Otherwise, how do we know if when we talk about thinking with others, including students in classrooms or other educational settings, that we are talking about the same or even similar things? If we're not talking about the same or similar things, or people are not sure what we mean, might this present a potential problem? I suspect so.

Now, I want to make it clear at this early stage of this podcast that I acknowledge that a lot of the thinking that we do happens in such a way that we are not aware of it…and this type of automatic, non-conscious thinking allows us to survive and function on a minute-to-minute, day-to-day basis. For example, we wake up in the morning and we might think something like, "Oh, it's 6AM. I have to get ready for work and have breakfast, and I have a full day of meetings, and tonight I am meeting friends at 7PM to have some fun." And as we go through the day a lot of our thinking is automated and we are not necessarily conscious of it unless something goes wrong or we have to deal with a situation that arises that maybe we didn't expect. This automatic, often sub- or unconscious type of thinking has several names and characteristics that I will explore in later episodes. However, in this episode I want to stimulate listeners to think about what it means to think, in general terms. In fact, a simple and often used definition of metacognition is that metacognition is 'thinking about one's thinking.' So, this is a good place to start, even if, as we go into future episodes, we realize that this definition is not of great pedagogical value.

To explore this notion of thinking, by way of an example, I'd like to ask you to remember back to my previous question which was, "Why might I be drawing your attention to this common, every day, and taken-for-granted use of the word 'think'?" You'll recall I gave you 10 seconds to think about a possible reason or reasons. Honestly, whatever reason you came up with, and whether you came up with any reason at all, is not very important. Rather, what I'd like you to do now is to try and recall what was happening in your head when you were trying to come up with a possible answer to my question. What thoughts did you have and what form or forms did your thoughts take? I'm going to give you another 10 seconds to try to remember.

Thanks for trying to remember. Now, let me speculate about what was going on in your individual and collective heads as you attempted to establish an answer to my question. I speculate that some people said things to themselves like:

- He's asking me this question to try to get me to link thinking to metacognition, or
- What might his reasons be for this question? or
- What might he be planning for later in this episode? or
- Yes, I remember hearing such language and being asked such questions in school. What were my teachers really asking me to do? or
- Where do I start to answer that question…I don't know him or how he thinks well enough.

And some might have thought:

- I'll just wait for 10 seconds, then he'll tell me. So, I don't really need to think about it anyway, or
- That's a silly question…how am I supposed to answer it?

These possible responses are predictions that I am making on the basis of my past knowledge and experience as a teacher at multiple levels of education. In each of these possible responses I have imagined (and I'm humbly sorry if I didn't imagine what you might have been thinking) that you are engaging in a conversation with yourself, using words. You are communicating with yourself in response to a task I asked you to participate in. Maybe you spoke the words out aloud, but I suspect that most of your self-communication was private, and only you know and remember what you said to yourself.

So, let me ask you to consider another thinking task. Maybe this one is easier? Let's see.

I want you to imagine an animal and what it might look like on the basis of the clues and hints I give you about its appearance and behaviour. This is a real animal, and I could also frame the task as 'identifying the animal,' rather than just imagining it. Here are the clues and hints:

1. It lays eggs.
2. It has webbed feet.
3. It has a bill that resembles that of a duck.
4. It feeds in streams.
5. It grows to about 5 inches in height.
6. It is a carnivore.
7. It has fur.
8. It has a tail that resembles that of a beaver.
9. Males have venomous stingers on the heels of their rear feet.
10. It is a mammal.

Do you know what animal I am describing? For the moment the answer is not important. In fact, the answer is not important at all. This is not a test. However, again, I want you now to try and remember what, and especially how, you were thinking as you tried to determine the type of animal I was describing. What was going on in your head?

The order in which I laid out the ideas is important. Here are some of the thoughts I imagine that some people might've had as I went through the characteristics. Once again, I can't predict what everyone might have thought, but I can get this correct for some people.

No. 1. It lays eggs. Maybe you said to yourself, "Birds lay eggs, but so do reptiles and amphibians," or maybe you pictured some eggs and asked yourself, "What type of animals lay eggs?"

No. 2. It has webbed feet. Maybe you said to yourself, "Some birds like ducks and pelicans have web feet, as do some reptiles like alligators and crocodiles and some amphibians like frogs…and these all lay eggs." Maybe it's one of those things? Maybe you pictured or visualized the feet of birds and those reptiles and some frogs?

No. 3. It has a bill, that resembles that of a duck. Maybe you said to yourself, "Ok, well, the idea that it can be something like an alligator or a crocodile or some type of frog doesn't seem possible now, because they don't have a bill that resembles that of a duck…seems like it could be a bird of some sort." Maybe you started to try to remember the birds with such characteristics, trying to think more about possible birds that it could be?

No. 4. It feeds in streams. Maybe you said to yourself, "Yes, this sounds like a bird of some sort that lives in or near streams." Maybe you said to yourself, "This is starting to make sense now." Maybe you have an image in your head about what sort of bird this might be?

No. 5. It grows to about 5 inches in height. Maybe you said to yourself, "Wow, that's some tiny bird," or "That's not very tall, is it?" Maybe you thought to use your hands and fingers to try to work out or guess or visualize how tall five inches is, and then asked yourself, "What birds do I know that are only 5 inches high? Maybe you thought, "There aren't too many aquatic birds that I know of that are only 5 inches high."

Maybe some time around this part of the clue sequence, or even before, you also said to yourself, "This is too easy. What kind of trick is he trying to play on me," or, "I'm not going to engage in this exercise anymore; I might get the answer wrong, and that wouldn't make me feel good," or, "He'll tell me the answer at the end, anyway."

On to No. 6. It is a carnivore. You might have thought to yourself "Ok, looks like we have a short, billed, web-footed, aquatic, animal eating, egg laying bird." Maybe you thought, "I

don't remember ever learning about such a bird, but maybe they do exist." You might say to yourself, "I know it's aquatic to some extent, and it makes sense that it could feed at the bottom of streams." "It's a possibility, isn't it?" you say to yourself.

As you are trying to go through this exercise up to here, you are gradually putting together an image of this creature, its appearance, its lifestyle, and its habitat. You are doing this on the basis of the information I provided and on the basis of what you know about that information and how you interpret it. You are communicating with yourself, likely using both words and images, and these words and images would be based on your past experiences and learning. You are asking yourself questions, drawing on your memory in relation to what you know about the words and ideas I am communicating to you…and most, if not all of your thinking in this task is 'apparent' or 'known' only to you.

And then, for some people, something happened. I said quickly, "It has fur," "It has a tail like a beaver," "The males have venomous stingers on the heels of their rear feet," and, "It is a mammal." And for some people there was a sense of unease as I provided that information. It made them reconsider what the possible identity of the creature was, based on their thinking prior to me presenting those last 4 points. And, some people might have said to themselves, statements like, "This creature doesn't make sense," "It can't be real," or, "I thought I was on the right path, but now I have to reconsider what I was thinking, based on this new information." And some might have said to themselves, statements like, "He's just trying to trick me," and "That's not fair," "I can't picture what this animal looks like," or, "It's a platypus, an animal that lives in Australia. I knew that all along, because I suspected Greg was up to something,[1] to make the listeners think, and I was wondering how he might do that."

One other thing you surely noticed was that, for the last 4 clues or hints, I decreased the amount of time between my presentation of them. I was allowing 4 or so seconds between presenting the first 6 pieces of information, and I shortened this to around 1 or so seconds for the last 4 pieces of information. I suspect most people noticed this. It was deliberate on my part.

In response to this change in the learning environment some people might have thought the following: "Oh, he's going faster now; I have to pay more attention," or, "Oh, he's going faster now, my thinking can't keep up with the information being presented at this speed; I can't do this now," or, "I wonder why he's going faster," or, I wish he would slow down; I was doing OK, up until now." And there might be, of course, other things that people thought when I sped up the pace of information presentation.

Again, the purpose of this activity was not to test anyone, or to see who knows anything about Australian wildlife. It was to stimulate in you what we term a 'metacognitive experience' – to stimulate you to become aware of your thinking and its characteristics and how you go about it – to draw your conscious attention to your thinking in such circumstances as 'self-communication.' This self-communication probably took the form of, (a) self-talk using language (likely English, as that is the language I presented the information in), or (b) visualization to imagine some of the structures I mentioned and their functions; to try to picture, as time went by, the overall appearance of the organism and where it lives (in places where there are streams). I didn't mention any of the sounds that the platypus might make, because I don't know what sounds they make.

This idea of thinking as self-communication is not new, and it's not mine. As I try to understand how to attend to the development and enhancement of my students' metacognition

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[1] In fact, that is what my son did and he answered "Platypus" after the very first clue. He knows something about how I think.

and of the metacognition of those they teach and will teach in the future, I am particularly drawn to the work of Anna Sfard, a mathematics educator, whose writing and ideas I greatly respect. In her 2008 book, 'Thinking as communicating: Human development, the growth of discourses, and mathematizing" published by Cambridge University Press, Anna Sfard (2008) explores this notion of thinking as communication. She defines thinking as the, "individualization of interpersonal communication (the process of communicating between a person and herself; one that does not have to be verbal)" (p. 302). Put another way, she states, "Thinking is an individualized version of communication (p. 81); the type of human doing that emerges when individuals become capable of communicating with themselves the way they communicate with others" (p. 91). And Sfard adds, "this self-communication does not have to be in any way audible or visible and does not have to be in words" (p. 82). I've put a reference to Anna Sfard's book in the transcript for this episode, the link to which can be found in the description of this episode on my Podbean site (https://metacognition.podbean.com/).

This definition of thinking resonates with me. And, I hope you've come to realize, if you didn't already before, that the simple tasks you participated in with me, stimulated your self-communication, i.e., your thinking, and my role in those tasks was to raise your awareness of your thinking, i.e., the self-communication you engaged in. I tried to provide some examples of what and how listeners might be self-communicating, and I surely did not present all the possibilities. But even then, some people might have said to themselves, "Hey, he hasn't said what I was thinking," and it's good to realize that, and to have that thought, and be aware of it.

Why is this notion of 'thinking as self-communication' important for metacognition? Here's my position. If metacognition is one's knowledge, control, and awareness of their thinking and learning processes, then metacognition becomes 'one's knowledge, control, and awareness of their, to use Anna Sfard's (2008, p. 91) idea, "the type of human doing that emerges when an individual becomes capable of communicating with themselves the way they communicate with others." Put more simply, metacognition is one's knowledge, control, and awareness of how one intra-personally communicates. And, if we consider that one often needs to think when one learns, and that there are thinking strategies that individuals can be explicitly taught and learn to help them learn and understand subject material and topics within and across subject areas, then developing and enhancing students' learning processes becomes about, among other things of course, explicitly teaching them about how they can communicate with themselves about how to engage and interact with the material in its various forms they are being asked to learn and understand.

Developing students' metacognition as a pedagogical goal is then an undertaking that involves stimulating students to consider their self-communication related to their learning processes and strategies, and providing opportunities for them to compare their self-communication to those of others, like their teachers. It involves making students (and individuals in any field for that matter) consciously aware of the thinking and learning strategies they use and their self-communication related to those strategies, and this awareness raising and reflection is what can result in them becoming more strategic and therefore potentially more successful learners. I stress the word 'consciously' here because don't we want students to be aware of, conscious of, and engaged with what they are learning about how they think and learn? This expectation is the same as us wanting them, in fact demanding them to be consciously aware of, engaged with, and demonstrate understanding of the subject material we want them to learn. We need to be explicit with students about the thinking and learning strategies we want them to learn about and use. And, we use these, what we might call 'thinking words,' all the

time; words like 'predict,' 'evaluate,' 'analyse,' and 'understand.' And, I wonder how explicit we are with students about what these words mean? My position about the need to be explicit with students varies with what I have heard from some teachers and others who state that we should leave it up to students to work this out for themselves. I disagree wholeheartedly with such people on this matter. If, as these people say, we are supposed to let students just work this out for themselves, then what is our role as teachers?

Adopting my perspective implies that we need to envisage a very different type of teaching, and that teaching I'm proposing involves much, much more than simply asking students to, "Think harder," to "Think more," or to "Think about it," (whatever 'it' is) as we have all likely experienced as students or learners before. In future episodes I'll be expanding on and exploring these ideas and their educational implications. I'll be talking about topics like a 'language of thinking' and how we might explain thinking and learning processes to students. And I want to introduce now, so that people know where I am eventually going, that it is my view that we develop and enhance individuals', including students' metacognition by giving them opportunities and reasons to reflect on their thinking and learning strategies. We don't even need to mention the word 'metacognition' to them.

There's one final point I'd like to make, and it involves the thinking (i.e., the self-communication) that I engaged in when I was scripting this episode. What self-communication do you think I engaged in?

Much of it involved me deliberately asking myself questions and then seeking answers to those questions; having a discussion with myself about possible answers to those questions. Here are some examples of the questions I asked myself: "What do I want listeners to think about in this episode?" "What type of thinking do I want listeners to engage in?" "What major points do I want listeners to learn?" "What will I leave out?" "What order will I present the information in?" "What pace will I present the information at?" "How will I structure the episode to try to stimulate the type of listener thinking I am aiming for?"

This is a sample of the type of thinking (the intra-personal communication) that I would expect ALL teachers that I teach to engage in when they plan instruction, irrespective of the subject or year level they teach. I have some knowledge of this 'teacher thinking.' I'm aware that, as a teacher, it is important for me to engage in such teacher intra-personal communication, that I do engage in it, and that I can and do control this thinking, at least some of the time. So, I can say that I am somewhat metacognitive in relation to the thinking that I employ as a teacher. Therefore, and importantly, because I have knowledge of this teacher thinking I can make this knowledge explicit to others in the form of information in various forms, such as this podcast. Therefore, it can become a potential object of my and others' consideration and I can try to teach my undergraduate teachers and those teachers I work with in the community and as graduate students about such thinking. I can provide them with information about it and stimulate experiences in them to prompt them to consider how the information I provide to them about teacher thinking is similar or different to their own metacognitive knowledge about teacher thinking. This, I argue, is essential in my role as a teacher educator.

I look forward to sharing future episodes about metacognition with you.

<div style="text-align:center">References</div>

Sfard, A, (2008). Thinking as communicating: Human development, the growth of discourses, and mathematizing. New York, NY: Cambridge University Press.