Conclusion

« 7 » As we now know, many scientists do involve their affective domain in channelizing experiments, evoking creative expressions to invent new ideas. And the overall scientific project is perhaps not best represented by such a selection of scientists. Similarly, many religionists throughout history have tried to apply logical reasoning to their beliefs, to the Christian philosophical project, for example. This activity is highly cognitive, and led to Platonic philosophy being incorporated (via the ancient writers Origen, Proclus and Plotinus) into Christian theology, especially in terms of the concept of "participation," distinguishing between we the participants and a deity in whom we participate (Perl 2007: 20). Religion is also not best represented by a selection of priests, imams, rabbis, preachers, etc., as these are specialized representatives who may themselves wrestle with the disjoint between an official construct and their own construals. Both domains suffer because of vitriol and internal conflicts. Interestingly, many religionists are scientists and vice versa; as McCloughlin, Kallery & Psillos (2015) and McCloughlin, O'Reilly & Kallery (2007) show, it cannot be assumed that such a dual activity leads to conflict or a diminution of one over the other. The fact that religion is highly variable even within one faith community suggests that religion may be ameliorable to some form of radical constructivism since outside of the primitives of a particular faith, highly individualized representations of beliefs exist at the unitary level. Finally, the current work, from a PCP perspective, suggests that the belief system of a believer exhibits an observeable structure not given to extreme polarities in their psychological space, suggesting a cognitive basis for their belief.

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Can a Radical Constructivist Be Religious? – Yes!

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> Upshot • The first of my three main goals in this commentary is to demonstrate that Quale's radical separation between cognitive and non-cognitive knowledge is not viable. The second is to establish Quale's assertion that a radical constructivist cannot be genuinely religious is a result of taking radical constructivism and religion as abstracted first-order models and is a result of comparing and contrasting elements of these models. The third goal is to establish how religious radical constructivists establish relations between their religious beliefs and their radical constructivist beliefs. To accomplish the first goal, I appeal to the work of Damasio to establish that what Quale refers to as "non-cognitive knowledge" is inextricably cognitive. I also appeal to the work of both Damasio and von Glasersfeld to demonstrate that the Cartesian duality between mind and body is not viable. To accomplish the last two goals, I make a distinction between first- and second-order knowledge and contrast Quale's argument that a radical constructivist cannot be religious with the relation between religious beliefs and radical constructivism from the perspective of actual religious radical constructivists.

Cognitive and non-cognitive knowledge as first-order knowledge

« 1 » In a previous article, Andreas Quale (2014a) made a distinction between cognitive and non-cognitive knowledge similar to the one he makes in the current target article. Although I find the distinctions that he makes between these two kinds of knowledge in the target article more acceptable, his distinction seems to separate these two kinds of knowledge more radically than I believe is warranted. In my commentary to Quale's (2014a) previous article, I explained why I consider non-cognitive knowledge as concepts. In doing so, I used Ernst von Glasersfeld's explanation of a concept:

> "'concept' refers to any structure that has been abstracted from the process of experiential construction as recurrently usable, for instance, for the purpose of relating or classifying experiential situations. To be called 'concept' these constructs must be stable enough to be re-presented in the absence of perceptual input." (Glasersfeld 1982: 195)

« 2 » In his Author's Response to the commentaries, Quale (2014b) agreed that what he calls "non-cognitive knowledge" could be considered as concepts. But he also asserted that these concepts are not cognitive concepts. The distinction that he makes in the present target article between cognitive and non-cognitive concepts resides in what he refers to as the "truth value" of a concept and appeals to logical reasoning as a basis for establishing it:

> "cognitive knowledge, as the term is used here, is based on logical reasoning of some kind, i.e., on argumentation using rules and procedures that can be agreed on; and knowledge derived from application of these rules can then be demonstrated and communicated by the knower to other individuals, and shared between them." (§13)

« 3 » Further, Quale uses scientific realism and scientific relativism in further clarification of his concept of the truth value of a scientific proposition:

> "I am taking them to describe different philosophical perspectives on the idea of ontological truth: realism asserts that objectively true propositions about the world exist, and can be identified by the knower; while relativism holds that the truth value of any proposition about the world is (and must be) subjective, depending on the context in which it is made, and that acceptance of this context will then depend on personal preferences of the knower." (§14)

« 4 » To exemplify what he means, Quale uses the example of electromagnetism:

> "This is *cognitive* knowledge, dependent on rules that can be communicated from me to you. And it is then *shared* between us, in the following

sense: if we both agree to abide by the rules (here as given by Maxwellian electrodynamic theory), I can take any particular piece of this knowledge, deduce various consequences from it, and check that you will indeed arrive at these results using the same procedures that I have used." (§12)

« 5 » Quale seems to interpret knowledge in physics in a way compatible with how Gabriel Stolzenberg interpreted mathematical knowledge: as invented by human beings rather than discovered. Stolzenberg's contention is, according to Paul Watzlawick, "one of the most fascinating aspects of [his] essay" (Watzlawick 1984: 254). However, although Stolzenberg believed that mathematics is invented, unlike Quale, he rejected any kind of relativism:

"when I stress the importance of standpoint, I am not preaching any brand of relativism. I do not say that there is your truth and my truth and never the twain shall meet." (Stolzenberg 1984: 260)

In taking this position, Stolzenberg was basically concerned with first-order mathematical knowledge of mathematicians. More generally, first-order models are the models an individual constructs to organize, comprehend, and control his or her experience (Steffe et al. 1983: iv). Although I believe that Quale would not agree with Stolzenberg's rejection of relativism, I do interpret Quale's comments on Maxwell's electromagnetic field equations, and on cognitive knowledge more generally, as pertaining to first-order cognitive knowledge. I also interpret Quale's comments on non-cognitive knowledge as referencing first-order knowledge:

"non-cognitive knowledge – sometimes termed 'affective' or 'emotive' knowledge – deals with personal experiences that cannot be so demonstrated or communicated: here there simply are no commonly accepted rules of reasoning to agree on! Such knowledge will include such categories as: emotion, volition, personal preferences, values, like and dislikes, belief, etc. One important example of non-cognitive knowledge is, as will be argued below, that offered by *religion*." (§8)

« 6 » In the case of both kinds of knowledge – cognitive and non-cognitive – there is an acknowledgement of a knowledgeable other. But second-order knowledge – the models observers may construct of the observed person's knowledge (Steffe et al. 1983: xvi) – remains implicit and unarticulated. As a result, I argue that Quale's distinction between cognitive and non-cognitive knowledge is subject to what Stolzenberg (1984) called a "trap," which is a:

"[c]losed system of attitudes, beliefs, and habits of thought for which one can give an objective[1] demonstration that certain of the beliefs are incorrect[2] and that certain of the attitudes and habits of thought prevent this from being recognized." (Stolzenberg 1984: 260)

Cartesian duality between mind and body

« 7 » Although Quale considers the kinds of non-cognitive knowledge that he alludes to in his target article as concepts, it does seem as if his separation between cognitive and non-cognitive knowledge is compatible with the Cartesian duality between mind and body – "I think, therefore I am" (Damasio 2005: 248). Descartes's statement does, according to Antonio Damasio, suggest that,

"thinking, and awareness of thinking, are the real substrates of being. And since we know that Descartes imagined thinking as an activity quite separate from the body, it does celebrate the separation of mind, the 'thinking thing' (*res cogitans*), from the nonthinking body, that which has extensions and mechanical part (*res extensa*)." (Damasio 2005: 248)

« 8 » Although von Glasersfeld made a distinction between "I think, therefore I am" and "I am aware of thinking, therefore I am," he did seem to agree with Damasio's suggestion about the Cartesian duality in the following passage:

"[T]he first person [the 'I'[3]] is assumed to be a constructor of knowledge. Thus the question arises whether the active agent, the 'subject' that is supposed to reside in this first person, can spontaneously construct knowledge of him- or herself. It has often been said that it cannot, and that the self-knowledge arises only from interaction with other persons." (Glasersfeld 1995: 121f)

« 9 » Both authors seemed to agree that Descartes's duality introduced the possibility that the "subject" could construct knowledge of him- or herself independently of experience or perception. In consideration of what Descartes meant by "I am," or "to exist," however, von Glasersfeld made it clear that Descartes considered space and time as absolutes and that "to exist" meant to occupy a position in this frame of reference. In that von Glasersfeld considered space and time as constructions, he reinterpreted Descartes statement as, "I am aware of thinking, therefore I am":

"To my mind, it is precisely this awareness of what one is doing or experiencing that is the foundation of what we ordinarily call our *self*. It does not have to be thinking in any elevated sense. If you are becoming aware of tying your shoe laces, you also become aware of the fact that there is a you who is doing it." (ibid: 122)

« 10 » Von Glasersfeld further elaborated that,

"In the constructivist view, the self we conceive, as well as its body, are necessarily the product of the active agent that Wittgenstein called the 'I' that is not part of the world. Whatever the otherworldly part of the self builds up is gauged according to its viability in experience." (ibid: 123)

« 11 » If the self is not part of the world, the question immediately arises concerning aspects of the self that are part of the experiential world. Von Glasersfeld answered this question in the following way:

"Instead of asking what the self is in the philosopher's sense, one can ask how we experience our self. This does not concern the mysterious entity that does the experiencing, but focuses on the tangible structure, the body that is experienced as one's own. Such an investigation takes the mysterious self-conscious entity for granted and proceeds to examine how the entity comes to recognize itself both as agent and as percept distinguished from the rest of its experiential field." (ibid: 123)

1| For a constructivist, "objective" would be deleted.

2| For a constructivist, "not viable" would be substituted for "incorrect."

3| Added for clarity.

Rejection of the Cartesian duality

« 12 » Von Glasersfeld's re-interpretation of Descartes's statement is essentially a rejection of the separation between mind and body that it implies.

> "This is Descartes' error: the abyssal separation between body and mind […] Specifically, the separation of the most refined operations of mind from the structure and operation of a biological organism." (Damasio 2005: 249f)

« 13 » Damasio does not regard mind as in the body. Rather,

> "[w]hat I am suggesting is that the mind arises from activity in neural circuits […] and that a normal mind will happen only if those circuits contain basic representations of the organism, and if they continue to monitor the states of the organism in action. […] I am not saying that the mind is in the body. I am saying that the body contributes more than life support and modulatory effects to the brain. It contributes a content that is part and parcel of the workings of the normal mind." (ibid: 226)

« 14 » Based on Damasio's findings, the personal experiences that Quale identified as non-cognitive – emotion, volition, preferences, values, likes and dislikes, beliefs, etc. – are seen as part and parcel of the workings of the normal mind. Damasio's work implies that these personal experiences are not more primitive than reason in that the experiences result from the workings of all parts of the brain, including the neocortex and not just the lower regions:

> "The apparatus of rationality traditionally presumed to be *neo*cortical, does not seem to work without that of biological regulation, traditionally presumed to be *sub*cortical. Nature appears to have built the apparatus of rationality not just on top of the apparatus of biological regulation, but also *from* it and *with* it. The mechanisms for behavior beyond drives and instincts use, I believe, both the upstairs and the downstairs; the neocortex becomes engaged *along with* the old brain core, and rationality results from their concerted activity." (ibid: 128)

« 15 » Damasio provided the following example of the relation between feelings and cognitive processes:

> "As an example, the cognitive mode which accompanies a feeling of elation permits the rapid generation of multiple images such that the associative process is richer and associations are made to a larger variety of cues available in the images under scrutiny." (ibid: 163f).

> "Emotion and feelings thus rely on two basic processes: (1) the view of a certain body state juxtaposed to the collection of triggering and evaluative images which caused the body state; and (2) a particular style and level of efficiency of cognitive processes which accompanies the events described in (1), but is operated in parallel." (ibid: 162f)

Opening the trap

« 16 » So, in Damasio's system, cognitive processes accompany what Quale regards as non-cognitive processes. Not only do they fit von Glasersfeld's notion of a concept, but also their cognitive nature opens the way for them to be communicated about.

> "The facts that I have presented about feelings and reason, along with others I have discussed about the interconnection between brain and body proper, support the most general idea with which I introduced the book: that the comprehensive understanding of the human mind requires an organismic perspective: that not only must the mind move from a nonphysical cogitum to the realm of biological tissue, but it must be related to a whole organism possessed of integrated body proper and brain and fully interactive with a physical and social environment." (ibid: 251f)

« 17 » The work of Damasio constitutes a demonstration that Quale's radical separation of cognitive and non-cognitive knowledge is not viable. Damasio's work also illustrates that having a belief and reasoning about beliefs are distinguishable, so, like other beliefs, one can reason about religious beliefs. When doing so, two people might start with the "same" religious beliefs and conclude very different things. Still, because it is possible to communicate about religious beliefs in the way communication is considered in radical constructivism (Glasersfeld 1995), it is possible to develop viable religious beliefs. Furthermore, because the mind is related to the whole organism, in the final analysis, religious experiences and beliefs are constitutively human experiences and beliefs, in that it is human beings who are doing the experiencing and believing. Although religious beliefs are considered transcendent and not of this world, it is the human mind that considers them in that way.

Religious beliefs of two radical constructivists

« 18 » Quale contrasts radical constructivism and realism essentially as first-order models:

> "[C]an a radical constructivist be genuinely religious – i.e., be a true believer in the doctrine of some definite religion? Here I would argue that the answer must be no! As noted above, the epistemic position of a religion is one of realism: its supernatural aspects, and its doctrine of an externally imposed design, are presented as being objectively true; and the believers are obliged to accept this truth in order to be received into the fold. In other words, the believer does not have the option that is available in RC: to regard the religion simply as constituting a model, constructed by the individual knower to generate knowledge that is viable for her, though not necessarily for other knowers." (§37)

« 19 » Rather than argue from these abstracted and generalized concepts of religion and radical constructivism, I contrast them with what two religious radical constructivists said about the relation between their religious beliefs and their radical constructivism. I appeal to Keith Leatham, who is a professor of mathematics education at Brigham Young University and who is also of the Mormon faith. Leatham explained that, in the case of the Mormon Church (The Church of Jesus Christ of Latter-day Saints),

> "the belief is that God is a physical although perfect being and that God (often referred to as Heavenly Father) created each member of the human family first as a spirit in his presence. Individuals then received a physical body when they came to earth. Although at death the spirit leaves the body, eventually the spirit and the physical body are joined together again and return to the presence of God." (Personal communication, 17 Sept. 2015)

« 20 » Given his brief explanation of the Mormon faith, I asked Leatham to comment on the proposition that, in the case of his religious beliefs, he would not adhere to radical constructivist principles, but, in the case of secular knowledge, he would not have any

problem with radical constructivism. His reply was as follows.

"The typical trouble I hear expressed by those who see conflict between radical constructivism and spiritual knowledge is the belief that RC principles somehow preclude the possibility of coming to know anything about God. I just see this as a misunderstanding of what RC claims and does not claim to be. For me RC is a theory of how one comes to know anything that has to do with our mortal existence. RC doesn't make claims beyond that kind of knowledge.

"That said, if someone has religious beliefs, then they typically believe in a being (God) that is somehow beyond this world and that man can have spiritual experiences with God. For me, I can simply throw those experiences into the mix, and then apply the RC principles just as I would with any other kinds of experiences. So actually, for me, I see no reason why RC could not help me to better understand how my knowledge of God is constructed – it actually has given me great insights into that area of my knowledge." (Personal communication, 16 September 2015)

« 21 » Given that Leatham asserted that he could "simply throw those experiences into the mix, and then apply the RC principles just as I would with any other kinds of experiences," he obviously considered his religious experiences as among his other experiences and that he reasons about how his knowledge of God is constructed. So, I became very interested in how he would reply to Quale's assertion that:

"A religion, on the other hand, asserts as a fundamental premise that all phenomena observed in the world are designed, created and maintained according to an intention and for a purpose, by some sort of designing power. Or, in brief: science excludes an externally imposed design, while religion requires it!" (§28)

« 22 » Leatham's reply was as follows:

"It is certainly a core tenet of Mormon doctrine that God created this earth for a purpose. (And that purpose is basically what was articulated in those sentences about Mormonism yesterday – to come to earth, get a physical body, and see if we will follow His commandments so that we can return to His presence having become more like Him). But I see no reason why there would be a conflict between this belief and science. I view scientific advancements as providing greater and greater insights into the *how* of creation and leave the *why* to my faith." (Personal comm., 18 Sept. 2015)

« 23 » At the same time that I was communicating with Leatham, I was also communicating with Katy Ulrich of Virginia Tech, who is a religious radical constructivist. She responded to a question on whether religion required an "externally imposed system" and how this related to creationism.

"RC and my belief in God are both extremely important parts of my life […] With regards to design, when I take the Bible as my data about the religious knowledge of the writers, I think it is safe to say that the idea that God has a design for the world we experience (note that I am assuming a Reality) is an important part of the Jewish tradition and continues into the Christian religion for most Christians. As for Creationism, neither my pastor nor I believe that the purpose of Genesis is to claim that the world was literally created in seven days. I believe that evolution is the most viable theory to explain most, if not all, designs we encounter in the natural world. However, because I believe that God designed the universe, I believe that natural selection is the mechanism he designed. I also believe that he can coordinate infinitely many levels of units, from our perspective. That is, he can deal with more complexity than could possibly be conceived of by us. Therefore, the idea that he has set into motion processes knowing that it would lead to certain aspects of our reality (as constructed by us, even) seems entirely plausible to me. Furthermore, with an absolute understanding of the working of everything, I also do not find it problematic that he can and does often alter the workings of the world, including our own thought patterns, through mechanisms that we do not understand, and probably never will. Having said all that, I would certainly not say, 'It's a miracle!' to explain how a student constructed a GNS." (Personal communication, 18 September 2015)[4]

« 24 » She also disagreed with Quale's sentiment that accepting her church's beliefs denies her belief that she has constructed a model of reality that is different than others' models:

"I can construct a first-order model intersubjective with the model of a religion and then join the religion. My interpretation of the beliefs we accept to join the faith are probably different than Quale's. His second-order model is that all religions demand we say that we are describing Reality instead of saying that we are describing our best models of Reality. That understanding of religious belief is not intersubjective with my own. I do, of course, act as if and even think as if my models are 'true' at times. But that is what we all do as RCs for all kinds of models." (ibid)

« 25 » In an earlier communication, Ulrich commented that, "I don't see why God would have to be barred a priori from my experiential model of reality. In fact, I dare say that one cannot deny the existence of God from an RC perspective" (Personal communication, 26 August 2015). Ulrich also agreed with Leatham about the "why" of existence rather than the "how."

« 26 » I never asked von Glasersfeld if he was religious. I do, however, vividly remember him commenting to me that, "I don't know how I got into this world, and I don't know how I will leave it." The way in which I interpret the "I" in his comment is precisely how he interpreted it above – as not in this world. For me, interpreting the "I" in that way opens the way for a radical constructivist to be religious. Isn't the basic motivation that drives anyone, including a radical constructivist, to be religious is for the self-conscious "I" to survive beyond the survival of the body that the "I" inhabits?

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4| GNS refers to the Generalized Number Sequence, an ensemble of operations that was constructed to explain students' mathematical reasoning (Steffe & Olive 2010).