

Polanyi, Kahneman and Tversky on Judging and Deciding¹

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In their preface to the *Blackwell Handbook of Judgment and Decision Making*, the editors Derek Koehler and Nigel Harvey (2002, xiv) say:

Understanding how people make judgments and decisions is an enterprise of such importance that its study is spread across many disciplines. The recent Nobel Prize in Economics awarded to Daniel Kahneman, for work conducted with the late Amos Tversky,² is a particularly vivid indication of the increasing recognition and impact of the field.

In this essay, by “the field” I will mean the interdisciplinary effort to understand how people judge and decide. Kahneman is a psychologist and his work with Tversky was the foundation for behavioral economics, as well as for the study of how people judge and decide in law, medicine and business. My thesis has two parts: (1) Polanyians that the have much to contribute to the field³ and (2) that the work done by Kahneman, Tversky and others in the field has some important lessons for Polanyians. This essay has two parts, corresponding to the two parts of my thesis.

¹ This is the fourth paper on judging and deciding I have presented at Polanyi Society meetings (Moodey 2001, 2002, 2017).

² Had Tversky still been alive, he surely would have shared the Nobel Prize with Kahneman.

³ I used Amazon’s “search inside” function for the *Blackwell Handbook* and found 196 entries for Kahneman, 189 for Tversky 196 and 3 for Michael Polanyi. One of the three states simply that Polanyi distinguished between tacit and explicit knowledge (Phillips, Klein and Sieck 2002, 301). The other two occurrences of Polanyi’s name is in a list of references and the index.

1 -- WHAT POLANYIANS CAN BRING TO THE FIELD

I write about just three of the things Polanyians can bring to this field: (1) personal commitment, (2) the *from-via-to* model and (3) crossing a logical gap.

1.1 Personal Commitment

The field can benefit from more attention to the state of commitment that makes a person's judging and deciding responsible. Much of the applied work in the field focuses on improving the quality of judgments and decisions. Responsibility is an important dimension of good judgments and decisions. Irresponsible judgments are less likely to be true, and irresponsible decisions are less likely to be prudent or wise. There are two dimensions to what I mean by "responsible." The first is that of taking responsibility for what I say and do. The second is that of responding in a fitting way to other persons (Niebuhr 1963). Responsibility is an aspect of conviviality, and connects it to good judging and deciding.

Researchers in the field of judging and deciding do not ignore personal commitment, but generally don't treat it as important as Polanyi did. Marjorie Green (1995-96, 9) said that the message of *Personal Knowledge* is expressed "in a nutshell" in the following text:

It is the act of commitment in its full structure that saves personal knowledge from being merely subjective. Intellectual commitment is a responsible decision, in submission to the compelling claims of what in good conscience I conceive to be true. It is an act of hope, striving to fulfil an obligation within a personal situation for which I am not responsible and which therefore determines my

calling. This hope and this obligation are expressed in the universal intent of personal knowledge (PK 65).

The meanings I attribute to this “nutshell text” depend upon making explicit a distinction between acts of commitment and states of commitment. I believe that distinction is implied by the text, even though it’s not explicit. When Polanyi equates “intellectual commitment” and “responsible decision,” he uses the nouns “commitment” and “decision” to point both to acts and states. “Good conscience” points to a personal state, a state *from* which Polanyi is able and willing: (1) to submit to what he conceives to be true, (2) to recognize that this act of submission is a personal obligation, (3) to respond to a calling for which he is not responsible. These are all elements in the “full structure” of the act *and state* of personal commitment. Acting in this way is also an act of hope, and act that results in a state of being hopeful. Polanyi’s state of being intellectually committed includes being hopeful that his acts and states of knowing are are not “merely subjective,” and thus can be expressed with “universal intent.”

A full interpretation of this nutshell text would have to be as long and the book it encapsulates. Rather than trying to say all that might be said about it, I want to point out that Polanyi’s attempt to describe the “full structure of commitment” requires him to use a set of terms that are so tightly interrelated that trying to explain what I understand him to have meant by any one of the them requires explaining what I understand him to have meant by the others. The meanings I attribute to “calling,” “situation,” “good conscience,” “responsible,” “merely subjective,” “universal intent,” “hope,” “self-accreditation” and “fiduciary program” are interrelated. What I mean by one depends upon what I mean by all the others. I don’t claim that the meanings I attribute to this

cluster of terms are identical to the meanings Polanyi attributed to them when he wrote them, but I do hope that my meanings are consistent with his.

In the introduction to *The Tacit Dimension* (2009 [1966] xviii), Polanyi says that over the years since the publication of *Personal Knowledge* and *The Study of Man* in 1958, he had reduced his “reliance on the necessity of commitment” by working out the *from-to* structure of knowing and doing. But there is a paragraph in the final chapter in which he re-emphasizes both the necessity and the structure of commitment. The first sentence suggests that the topic is “responsible judgment,” but the final sentence convinces me that Polanyi’s focus is on the structure of commitment:

I have shown how man can exercise responsible judgment when faced with a problem. His decisions when casting around for a solution are necessarily indeterminate, in the same sense that the solution of an unsolved problem is indeterminate; but his decisions are also responsible in being subject to the obligation to seek the predetermined solution of his problem. I have said that this is a commitment to the anticipation of a hidden reality, a commitment of the same kind as exemplified in the knowledge of scientific truth. Responsibility and truth are in fact but two aspects of such a commitment: the act of judgment is its personal pole and the independent reality on which it bears is its external pole (TD 87).⁴

⁴ D.M. Yeager (2008, 101) quotes the final sentence of this paragraph immediately before saying: “The act (and art) of personal judgment is, in fact, the core of his [Polanyi’s] distinctive conception of the nature of knowing as he develops it in interlocking texts over several decades.” Although I agree that the act and art of personal judgment is *at* or *in* the core of Polanyi’s philosophy, I believe that *the* core of his philosophy contains a complex cluster of closely interrelated terms and the meanings he attributed to them.

Like the nutshell text, this paragraph is about the structure of commitment. The final sentence points to four parts that constitute this structure. There are two aspects -- “responsibility” and “truth” -- and two metaphorical “poles.” The act of judgment is the “personal pole” and the independent reality is the “external pole.”

This “two poles” paragraph convinces me that, despite what Polanyi said about having reduced his emphasis on commitment, it continued to be essential to what he meant by responsible judging and deciding. It also convinces me that he did distinguish between the act of judging and the act of deciding, even though, as far as I have been able to determine, he never made that distinction explicit. My belief that he distinguished tacitly between the act of judgment and the act of decision derives from my belief that he never said, and never would have said, that the act of *decision* is the personal pole that bears upon the external pole of independent reality.

Judging and deciding are acts of personal commitment. By judging, I commit myself to a belief, either in the truth or falsity of a declarative sentence or in the goodness or badness of something other than such a statement. By deciding, I commit myself to doing something or to refrain from doing something. I make these assertions with universal intent. All humans make personal commitments whenever they judge or decide. Without personal commitment, the judgment or decision is worth no more than an unsigned check (PK).

Another way that personal commitment can enrich the field is by the way it adds meaning to John Searle’s (2010) division of the tacit dimension into two distinct, but partially overlapping, categories. There is a "Network" of intentional states that shades into a "Background" of non-intentional, or pre-intentional, dispositions.

A passage from Kahneman's *Thinking, Fast and Slow* (2011, 52) seems to me to describe what Searle calls "Background," rather than "Network":

I will adopt an expansive view of what an idea is. It can be concrete or abstract, and it can be expressed in many ways: as a verb, as a noun, as an adjective, or as a clenched fist. Psychologists think of ideas as nodes in a vast network, called associative memory, in which each idea is linked to many others. There are different types of links: causes are linked to their effects (virus→cold); things to their properties (lime→green); things to the categories to which they belong (banana→fruit). One way we have advanced beyond Hume is that we no longer think of the mind as going through a sequence of conscious ideas, one at a time. In the current view of how associative memory works, a great deal happens at once. An idea that has been activated does not merely evoke one other idea. It activates many ideas, which in turn activate others. Furthermore, only a few of the activated ideas will register in consciousness; most of the work of associative thinking is silent, hidden from our conscious selves. The notion that we have limited access to the workings of our minds is difficult to accept because, naturally, it is alien to our experience, but it is true: you know far less about yourself than you feel you do (2011, 52).

This is from a chapter entitled "The Associative Machine," and it brings out the scope and complexity of the tacit dimension. It's important to note Kahneman's use of the currently popular network metaphor.⁵ The source domain is the image of a net, with knots pointing to ideas and strings pointing to the connections between and among

⁵ Stephen Turner's (2014, 4) says when writing about the tacit: "Recognize metaphors as metaphors, and analogies as analogies."

ideas. Kahneman describes a complex and dynamic network, in which there are different kinds of metaphorical strings, and in which a person's learning experiences continually create, strengthen, weaken or even dissolve existing strings. Very few of the knots and strings can be, at any moment, conscious. Even though he doesn't use the phrase "tacit dimension," that's what he's writing about.

Polanyi's description of his matrix of beliefs seems to be closer to what Searle means by a Network of intentional states than to a Background of non-intentional dispositions. This is because "belief," unlike "idea," connotes a personal commitment.

If, then, it is not words that have meaning, but the speaker or listener who means something by them, let me declare accordingly my true position as the author of what I have written so far, as well as of what is still to follow. I must admit now that I did not start the present reconsideration of my beliefs with a clean slate of unbelief. Far from it. I started as a person intellectually fashioned by a particular idiom, acquired through my affiliation to a civilization that prevailed in the places where I had grown up, at this particular period of history. This has been the matrix of all my intellectual efforts. Within it I was to find my problem and seek the terms for its solution. All my amendments to these original terms will remain embedded in the system of my previous beliefs. Worse still, I cannot precisely say what these beliefs are. I can say nothing precisely. The words I have spoken and am yet to speak mean nothing: it is only *I* who mean something *by them*. And, as a rule, I do not focally know what I mean, and though I could explore my meaning up to a point, I believe that my words (descriptive words)

must mean more than I shall ever know, if they are to mean anything at all (PK 252).

Polanyi does speak of the modification of prior beliefs, but his description of *his* matrix of beliefs is less vividly dynamic than Kahneman's description of *anybody's* "network" of ideas. I say that "beliefs" belong in Searle's Network of intentional states in a way that "ideas" don't because beliefs are intentional states. If my conscious attention is drawn to a belief to which I had not previously been attending, I will habitually affirm it to be true or false, and will overtly assert my belief if called upon to do so. That is, I intend to affirm my beliefs when the occasion arises.

Further, I rely upon all the beliefs and ideas in my tacit dimension. It is *from* these, as tacit subsidiaries, that I give meaning *to* the object of my conscious, focal attention. Polanyi writes about this at some length in Chapter 9 of *Personal Knowledge*, "The Critique of Doubt." He argues that the Cartesian method of universal doubt is psychologically impossible. I can doubt an idea that's expressed in a declarative sentence, but even attributing meaning to this sentences requires me to rely on tacit beliefs that am not, at that moment, able to doubt. Polanyi's later essay, "Sense-Giving and Sense-Reading" (KB 181-207) elaborates on the ways speakers, writers, hearers and listeners rely upon their individual tacit backgrounds to attributing meaning to spoken and written messages. By relying on tacit beliefs, we commit ourselves to them.

1.2 From-Via-To

Walter Gulick (1999-2000; 2012-2013) has added a *via* term to Polanyi's *from-to* model. I modify Gulick's model by using the acts of judging or deciding, rather than

symbol, as the *via* term. When I judge or decide, I move *from* a prior state *via* an act of judging or deciding *to* a subsequent state.

Polanyi has described the ideal state prior to judging responsibly in the nutshell text and the poles text. To be responsible, I must be committed to discovering the whether or not a sentence is true or false or whether something other than a sentence is good or bad. One aspect of this commitment is my self-accreditation (PK 265), my reasonable hope that I can *truly* judge truth, falsity, goodness and badness.

The ideal state prior to deciding responsibly has the further dimension of a commitment to “performative consistency.” Polanyi doesn’t use this term, but I have argued (Moodey 2017) that it is implied in his frequent references to “good conscience.” It is also implied by his use of retortion, the argument from performative inconsistency, to refute positions to which he is opposed (Moleski 1987). It is the commitment that results from following the Jiminy Cricket prescription, “always let your conscience be your guide.” It is the commitment conspicuously absent in those who suffer from moral inversion (Yeager 2002-2003).

The acts of judging and deciding that I treat as the *via* term are conscious acts, but, for me at least, they have a dimension that remains tacit. At the moment I judge or decide, I can’t phenomenologically distinguish between the act of judging and the act of deciding. I can distinguish phenomenologically between the prior states and the subsequent states, but not between the acts by which I undergo the changes in state. I will explore the reasons for this in the next section.

In contrast to the *acts* of judging and deciding, I can describe the experiential differences between the *subsequent states*. After I judge, I’m in a new state of belief.

After I decide, I'm either in a new state of action, or in a new state of being committed not to perform some action.

1.3 Crossing a Logical Gap

D.M. Yeager (2008, 105; quoting PK 261) provides a clue as to why it's impossible to formulate a good phenomenological description of the personal experience of judging or deciding:

Polanyi also holds that every act of commitment, discovery or assent is necessarily indeterminate at the moment of its occurrence because such acts always involve some imaginative crossing of a logical gap between what is known and what is yet to be known. Whether this gap is "almost imperceptible" or "as large as any human mind can hope to overcome," the passage across it is "essentially unformalizable" (Yeager 2008, 105; quoting PK 261).

To speak of an "imaginative crossing of a logical gap" is to speak metaphorically. Polanyi and Harry Prosch (M 62) wrote: "Our dwelling in the particulars, the subsidiary clues, results in a synthesis into a focal object only by means of an action of our imagination – a leap of a logical gap" (M 62). The metaphor of leaping or plunging across a gap (PK 123) tells us something about what it feels like to discover, judge, or decide, but the act of crossing is ultimately indeterminate and unformalizable.

Even as a Polanyian who has long been comfortable with accepting the tacit dimension, I find it hard to accept that my *acts* of judging and deciding are indeterminate, unformalizable and not experiences for which I can provide a phenomenological description. But I do accept it.

This bears on the variable degree to which students of judging and deciding believe that these acts can be formalized as algorithms. Grene (1995, 18) coined the pejorative label “algorithmaniacs.” She was probably more critical of algorithms than I, because I cannot in good conscience deny their usefulness in some situations. I think Polanyi got it right:

we must allow for the fact that a personal act can be *partly formalized*. By reflecting on the way we are performing it we may seek to establish rules for our own guidance in this act. But such formalization is likely to go too far unless it acknowledges in advance *that it must remain within a framework of personal judgments* (PK 29; Polanyi’s italics).

“Framework” is a metaphor that serves the same purpose as “network” and “matrix.” The personal judgments that constitute the framework, network or matrix are tacit, unspecifiable, unformalizable. By reflecting on the practices of experts, researchers in artificial intelligence have been able to establish rules that guide computers to the successful solving of problems. The best chess-playing computers can beat human chess masters. I am not persuaded, however, that computers or robots will ever become conscious and responsible actors in the way that humans -- at least some of us, some of the time -- can be.

In principle, the Polanyian limits to algorithmic problem solving can be identified by phrases such as “crossing a logical gap,” “conscience,” “responsibility,” “indeterminate” and “unformalizable.” I do not believe, however, that this principle can be used to set practical, *a priori*, limits to what algorithms and artificial intelligence can accomplish.

2 -- WHAT "THE FIELD" CAN TEACH POLANYIANS

I focus on just three of the things I believe Polanyians can learn by paying attention to work done in the field of judgment and decision making: (1) maintaining a distinction between the act of judging and the act of deciding, (2) being aware of the distorting effects of heuristics and biases and (3) recognizing the dual processing in our minds and brains.

2.1 Distinct Acts

Kahneman and Tversky distinguished between judgment and decision. Two ground breaking papers from the 1970s are "Judgment Under Uncertainty: Heuristics and Biases" (1974) and "Prospect Theory: An Analysis of Decision Under Risk" (1979). Kahneman (2011, 10) later said of these two papers: "Immediately after completing our review of judgment, we switched our attention to decision making under uncertainty." As the name of the field, "judgment and decision making" indicates, most of those who have followed them distinguish between acts of judging and acts of deciding.

Polanyi was not always clear as to whether or not he distinguished between the act of judging and the act of deciding. He used the noun "judgment" to point to the power or faculty by which a person either judges or decides, to an act, and to the product of the act.⁶ He did not use the noun "decision" to point to a power, but to an act and the product of that act. As I said in my discussion of the "poles text," I don't think Polanyi ever would have said that the act of *decision* is the personal pole that bears on an independent reality, and thus distinguished tacitly between the act of judging and the

⁶ Writing about "judgment," Yu Zhenhua (2004-2005, 25) says that the word "usually has two meanings: first, the power or faculty of judgment, and second, the result of the exercise of this power, that is, the product of various judgments about things we are concerned about." He omits noting that "judgment" also points to the act of exercising the power.

act of deciding. However, I don't think that arguments among Polanyians as to whether Polanyi *really* distinguished between the act of judging and the act of deciding are especially fruitful. Nor do I think that Polanyians will add much to the field of judgment and decision making by trying to convince the members of that field that judging is really a kind of deciding. As I said above, I think it is much more fruitful to accept the distinction as well-established, and to focus on the importance of personal commitment for responsible judging and deciding

2.2 Being Aware of Heuristics and Biases

Michael Lewis' title, *The Undoing Project: The Friendship that Changed Our Minds* (2017), is taken from Kahneman and Tversky themselves, who sometimes called their own work their "undoing project." By devising experiments that demonstrated how pervasive heuristics and biases are in human judging and deciding, they sought to "undo" the overconfidence most of us have in our ability to judge correctly and decide wisely. It's important to note that their negative use of "heuristic" as an intellectual shortcut differs from the positive connotation in Polanyi's notion of "heuristic passion." From the very [long list](#) of cognitive, social and emotional biases, I have selected [confirmation bias](#) and [bias blind spot](#) to write about, and have selected the representativeness heuristic from the much [shorter list](#) of heuristics.

Polanyians might be especially liable to confirmation bias because of the effect upon us of Polanyi's emphasis on self-accreditation and his statement of purpose for writing *Personal Knowledge*. "The purpose of this book," he said (PK 214), "is to achieve a frame of mind in which I may hold firmly to what I believe to be true, even

though I know that it might conceivably be false.”⁷ If I think about the full range of the matrix of beliefs, the frame of mind he speaks of must also include holding firmly to denying what I believe to be false, even though I know that it might conceivably be true. Confirmation bias is a tendency to give too much weight to evidence that supports sentences that are consistent with my Network and Background, combined with a tendency to put too little weight on evidence that supports sentences that are inconsistent with my matrix of beliefs.

My confirmation bias is aided by my [bias blind spot](#) -- an inability to see *my* biases.⁸ Because my biases operate mainly in my tacit dimension, I am not conscious of them. I don't know the extent to which my judgments and decisions are distorted by confirmation bias, or any of the many other biases to which I am vulnerable. Even though I hold firmly to the belief that my judgments and decisions are subject to confirmation bias, that does not mean that I have overcome the pervasive effects of this bias. I affirm the existence of confirmation bias and bias blind spot with universal intent: *everyone*, to a greater or lesser degree, tends to interpret and judge things in the light of his or her beliefs, and has a bias blind spot.

Recognizing that I am subject to confirmation bias and a host of other biases does not mean that I embrace the Cartesian program of universal doubt. I agree with Polanyi that this program is psychologically impossible. Nor does it mean that I reject Polanyi's fiduciary program, including his emphasis on self-accreditation. For me, it means that I put more emphasis on the ways that the things I believe “might conceivably be false,” and on the ways that the things I deny might conceivably be true.

⁷ D.M. Yeager entitled her essay on Polanyi's notion of judgment “The Deliberate Holding of Unproven Beliefs': Judgment Post-Critically Considered” (2008).

⁸ This is often coupled with a cultivated ability to notice the biases of *others*.

I remain committed to all that's in my Network and Background, because I rely tacitly on those intentional states and dispositions in all of my knowing and doing, but I also remain committed to overcoming the bad effects of my biases.

The representativeness heuristic is illustrated by what Kahneman (2010, 156) calls his and Tversky's "best-known and most controversial experiment." It stars a fictitious person they called Linda.⁹ Kahneman warns us to remember that their description of Linda was written for experiments conducted in the early 1970s:

Linda is thirty-one years old, single, outspoken, and very bright. She majored in philosophy. As a student, she was deeply concerned with issues of discrimination and social justice, and also participated in antinuclear demonstrations (Kahneman 2010, 156).

Kahneman and Tversky gave this list to two groups of subjects, and also gave the two groups slightly different lists of occupations, and asked them to rank them in terms of probability, assigning 1 to the most probable and 7 to the least probable. The list given to group A was:

1. Linda is a teacher in elementary school.
2. Linda works in a bookstore and takes yoga classes.
3. Linda is active in the feminist movement
4. Linda is a psychiatric social worker.
5. Linda is a member of the League of Women Voters.
6. Linda is a bank teller.
7. Linda is an insurance salesperson.

⁹ Keith Stanovich (2009, 147) points out that there is a huge literature devoted to the "Linda problem," and provides a lengthy list of references.

The list given to the group B was identical, except for one item. They replaced “Linda is a bank teller,” with “Linda is a bank teller and is active in the feminist movement.” Both groups agreed that Linda is a good fit with “active in the feminist movement” and “works in a bookstore and takes yoga classes” and a bad fit with “bank teller” and “insurance salesperson.” But group B ranked “bank teller and active in the feminist movement” much higher than group A ranked “bank teller” (Kahneman 2010, 156-157)

“Bank teller” has to be more probable than “bank teller and active in the feminist movement.” There are many more bank tellers than there are bank tellers who are active feminists, and every *feminist* bank teller is also in the larger category of bank teller. Kahneman and Tversky then modified the experiment so that they asked just one group of subjects to engage in ranking the items on a list in which the first six items were the same as the six non-crucial items in the first list. Number seven was “bank teller” and number eight was “bank teller and active in the feminist movement.” They thought that this organization of the list would make most respondents see that the larger category “bank teller” would include the smaller category. But 89% of the Stanford undergraduates in their sample ranked the smaller set, “bank teller and active in the feminist movement,” as more probable than “bank teller.” They then used a sample of doctoral students in the “decision-science” program in the Stanford Graduate School of Business. All had taken graduate-level courses in statistics, but 85% of this sample thought that it would be more likely that Linda would be in the smaller set than in the larger set.

They engaged in what Kahneman called “increasingly desperate” attempts to eliminate the mistake of judging the less probable as more probable. They conducted a

series of experiments in which they eliminated all options but the crucial pair. After describing Linda, they asked:

Which alternative is more probable?

Linda is a bank teller.

Linda is a bank teller and is active in the feminist movement.

They sampled of students in several universities, and at each place 85% to 90% of the answers were that the Linda was more likely to be a *feminist* bank teller than she was to be just a bank teller. They presented the problem to the naturalist Stephen Jay Gould, who, despite knowing the correct answer, struggled with it. He wrote: “a little homunculus in my head continues to jump up and down, shouting at me -- ‘but she can’t be just a bank teller: read the description’” (Kahneman 2010, 158-159).

This “representativeness heuristic” is operative even in the thinking of statistically trained students and successful scientists. We bypass what is a relatively easy estimation of relative probabilities in favor of a good story. Linda just “looks like” a person who, if she were a bank teller, would also be a bank teller who was active in the feminist movement. This is an example of the fast thinking Kahneman writes about in *Thinking, Fast and Slow*.

2.3 Dual Processing

In *Thinking, Fast and Slow*, Kahneman reviews his collaborative work with Tversky, but also organizes the book around the distinction between fast and slow thinking, his way of describing what’s also known as the “dual processing” tradition of research. Stanovich (2009, 215, note 3) says that the distinction between fast and slow thinking was only implicit in Kahneman’s collaborative work with Tversky. He says:

“Evidence from cognitive neuroscience and cognitive psychology is converging on the conclusion that the functioning of the brain can be characterized by two different types of cognition having somewhat different functions and different strengths and weaknesses. That there is a wide variety of evidence converging on this conclusion is indicated by the fact that theorists in a diverse set of specialty areas (including cognitive psychology, social psychology, cognitive neuroscience and decision theory) have proposed that there are both Type 1 and Type 2 processes in the brain” (Stanovich 2009, 21-22).

When I’m engaged in fast thinking, I’m much more likely to allow biases to affect my judging and deciding, and much more likely to take the mental shortcuts Kahneman and Tversky call “heuristics.” When I’m thinking more slowly am I aware that there are tacit heuristics and biases lurking in my Network and Background, even though it’s hard from me to bring them to focal awareness.

Stanovich (2009, 22) provides a useful list of contrasts between fast and slow thinking, or “Type 1” and “Type 2” processing. Type 1 processes are:

1. fast,
2. “mandatory when the triggering stimuli are encountered,”
3. “do not require conscious attention,”
4. “not dependent on high-level control systems,” and
5. “can operate in parallel” -- more than one can be going on simultaneously.

Type 1 processing is the “default” mode of cognitive processing. The characteristics of Type 2 processing are the opposites of each of the five characteristics of Type 1

processing. Not only is it slower and dependent on conscious attention, it actually requires more physical energy (Kahneman 2010, 41-44).

Polanyi didn't distinguish between Type 1 and Type 2 processing, but, because of his emphasis on scientific thinking, he wrote mostly about Type 2 slow thinking. The frame of mind he described as the objective of his writing *Personal Knowledge* is a Type 2 frame of mind, and the self-accreditation by which a person achieves this frame of mind is also a Type 2 process. What the experiments of Kahneman, Tversky and their successors in the field of judgment and decision making emphasize is the importance of that qualifying phrase in Polanyi's description of his idealized frame of mind: "I know that it might conceivably be false."

Conclusion

Although I have argued for maintaining a distinction between the act of judging and the act of deciding, I do not deny that they are both intimately connected and, as the *via* terms between prior and subsequent personal states, impossible to describe phenomenologically. The connection between judging and deciding is especially close in the case of value judgments. When considering which of several possible courses of action to follow, I probably will decide to take the one I have judged to be better than the others, or in some cases, less bad than the others. But I have said "probably" because I believe that it's possible to decide to perform an action I have judged to be bad. In traditional moral terms, I'm free to sin. Cognitive determinism, the belief that I *must* decide to do what I have judged to be better -- or less bad -- denies this aspect of human freedom.

I think it's also important to maintain a distinction between the act of judging and the act of discovery. Jon Fennell (2015-2016) has argued this in "Polanyi's 'Illumination': Aristotelian Induction or Peircean Abduction?" Polanyi, like C.S. Peirce and Bernard Lonergan, but unlike Aristotle and Louis Groarke (2009), argues that the act of illumination or discovery results only in hypotheses that must subsequently be verified or falsified. In terms of dual processing, immediately to affirm the truth of what's discovered by "illumination" is Type 1 thinking. It is the default kind of cognitive processing. Delaying this affirmation, subjecting declarative sentences to processes of verification and falsification Type 2 thinking. Scientists and scholars, to be responsible, must be committed to engaging in the hard work of slow thinking.

Lewis echoes the language of Kahneman and Tversky in calling their collaboration the "undoing project." Polanyi was also engaged in an undoing project. He sought to undo the bad effects of a false ideal of detached, impersonal, scientific objectivity. That false ideal was expressed symbolically as an ideology, but when biologists and social scientists embraced that ideal, it became a mental bias -- a systematic, but mostly unconscious, distortion of their acts of judging and deciding.

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