What would a young 'essentially computational' mind look like?

To join a school math club, Will, an eight-year-old third-grader must solve the following problem. His teacher briefly shows him the list of numbers to the right, and says "Look at this list of numbers. Then tell me what number should be to the right of 50."

"One hundred and forty-nine," Will replies.

1	—	—
2	—	—
3	—	8
4	—	11
5	—	14
6	—	—
7	—	—
8	—	—
9	—	—
10	—	—
11	—	—
12	—	—
13	—	—
14	—	—
(....)	(....)	(....)
50	—	?

Will's parents had taken college math courses through advanced calculus, yet each had to devote a great deal of time to find the answer—which the mother finally represented as $2n + n - 1$ (which, of course, is $3n - 1$). The parents had both seen that one could arrive at the answer by the laborious task of continuing to add 3 to the first number on the right until 149 was reached.

Will had looked at the list exceedingly briefly and replied "One hundred and forty-nine." For the parents, '*n*' didn't stand for '*any number*' but *was* a number, hence the laboriousness of their task of getting to 149. The mother had to reason backwards to derive the still-unreduced equation. For Will, on the other had, '*n*' was an **empty category, a place-marker**, and thus easily and instantaneously manipulated.

Ability in one context is disability in another. When first encountered at age four, Will appeared to be a walking cognitive-emotional disaster. He was often confused, easily frustrated, emotionally labile, and prone to prolonged and intensely dramatic hysterical crises when he didn't understand, couldn't do something, or when it was brought to his attention that he did or said something 'wrong.' Will projected guilt and blame and had logical—if irrelevant, unrealistic—explanations for what he didn't understand or do 'correctly.'

Will's insistence that he was right and others were wrong was obsessive to the point of appearing paranoid. His misuse of language and strange neologisms made him appear confused and 'thought-disordered.' Most striking was Will's frequent reversal of pronoun gender—'him' for 'her' or 'hers' for 'his.' All in all, at age four, this child appeared to be one of the most 'damaged' children I had encountered since my clinical work with children in a state mental hospital setting several decades earlier—a veritable cognitive, emotional, and behavioral mess. Traditional clinical categories would have generated explanations or diagnoses for this child ranging from childhood psychosis or even schizophrenia to pervasive developmental disorders, 'central processing disorder,' and/or 'developmental speech and language disorder,' or suspicion of some sort of potentially identifiable brain pathology. Because of his flitting attention span, poor judgment and impulsiveness, observers were quick to add 'Attention-Deficit/Hyperactivity Disorder' to the list. Today, a good fifteen years later, the choice would be "Autism Spectrum Disorder." Will's fortunate saving grace, however, was that he was an immensely attractive child whose intermittent warmly attaching interpersonal style was punctuated by moments of sparkly poetic thinking and a voice as finely modulated as that of Johnny Mathis at his height. In fact, the director of a major adult chorus urged Will's parents to dissuade him from routinely singing with his superb vibrato because doing so would supposedly ruing his adult voice.

Once I heard the story of Will's solution to the number problem I told the parents that it appeared that I had been right initially. Will's mind 'said' *Utterance requires a possessive pronoun, so use one!* The mind tends to operate on categories first and on content second, if at all. Providing a possessive pronoun logicolinguistically satisfied the categorical requirement for *a pronoun*. Like '*n*', pronoun gender was an **empty category, a place-marker**, and thus could be easily and instantaneously manipulated—*categorically* manipulated. This ability to think in computational fashion could easily dispense with particulars. (Will reminds me just a bit of the great and quirky number theorist Paul Erdös who would show up on a friend's doorstep with the greeting "Let n equal… .") We 'normals'—or neurotypicals, as we are now called—are particular-bound, whereas the Wills of this world are (initially) particular-free—which can make them appear to be VERY disturbed and VERY dysfunctional. If the human environment remains supportively facilitating and provides adequate reliable structure and thus relative predictability of experience, the overwhelming nature of fully-processed-but-not-understood data gives way to brilliantly adaptive and flexible contextually-relevant reasoning. Children like Will—unlike the genuinely autistic—are plagued early in life with what I call *epistemic panic* because they *process too much and too well*, and it makes them appear very disturbed. The more one 'treats' these individuals "appropriately," the more disabled they become.

Will's supposed 'attentional' disorder wasn't what it appeared to be, either. Will didn't lack attention; he was just infinitely quicker at processing information than his peers, his teachers or his parents. Will had already moved on by the time others had started to sum up the situation. So too for Will's flitting from thing to thing and from activity to activity. Will's attention to exquisite detail was one of his Achilles' heels. If he perceived even the *slightest* hint of imperfection or potential failure—a Lego piece that didn't fit, a word poorly written—Will quickly ceased his attempt or turned to something else, usually with a burst of negative emotion. With his emotions better modulated, Will's 'impulsiveness' and 'attention deficit' were more easily recognized for what they really were—exquisite attention to detail and much faster-than-normal processing.

Bertrand Russell was another Will-like person with a computational mind—not cold and disconnected but often emotionally incontinent like Will. Minds like Will's are troubled by paradoxes and logically consistent inconsistencies.[1] Needless to say, Russell was troubled by the Barber Paradox: "The village barber shaves all those in the village who do not shave themselves. Who shaves the barber?" The paradox, the inconsistency, is about logic, not about the world: if the barber shaves himself, then he doesn't shave himself. Russell loved these exercises in the gymnastics of meaningless meaningfulness. Another is his 'proof' that if 2 + 2 = 5, then he was the Pope: Accepting the premise that 2 + 2 = 5, one subtracts 2 from each side of the equation, giving us 2 = 3. Transposing gives us 3 = 2. If we subsequently subtract 1 from each side, we get the result 2 = 1. Thus, Russell concluded, because he and the Pope are two people and 2 = 1, he and the Pope are one. Russell was an emotional mess like Will, not a 'high-functioning autistic' person—and, by the way, when is *selfishness* just plain selfishness—and not 'deficient social cognition'?

Wittgenstein, on the other hand, was decidedly more disconnected and un-at-home in the human world than Russell. John Searle says that Wittgenstein "is taken by many to have shown that our

[1] "As Frege himself said when confronted with Russell's paradox, 'Your discovery of the contradiction has surprised me beyond words and, I should almost like to say, left me thunderstruck, because it has rocked the ground on which I had meant to build arithmetic.' It seems 'to undermine not only the foundations of my arithmetic, but the only possible foundations of arithmetic as such'" (Searle 1998:3).

discourse is a series of mutually untranslatable and incommensurable language games" (Searle 1998:4). Well, yes. But we have to put all this in perspective, however, because *Wittgenstein's own personal discomfort (or even agony) over the iffiness of mutual understanding* is far from representative of the average person's view of language and communicative success. If Wittgenstein is normal, then Pierre Boulez once sang, danced and played with the Beatles. Ask yourself: What would a computational mind look like in music? The answer: Pierre Boulez.

The computational mind is infinitely more interested in and attuned to empty logic than to conventional language. Thus, if syntax requires a pronoun, all the mind has to do to logically satisfy the requirement is to *insert a pronoun*, any pronoun. Because any pronoun will assure logicolinguistic satisfiability, literally any pronoun will do regardless—of gender or number. Such usage satisfies the computational mind but convinces others that the speaker is cognitively impaired.