# Looking Autism in the Face: Two New Perspectives on the Spectrum

by Robert B. Waltz

#### **General Preface**

This book was conceived as two separate items, one a journal article about Charles Dodgson, Alice Liddell, and autistic friendships; the other a book of famous examples of a particular sort of autistic, intended to demonstrate what these special people are like.

Unfortunately, the journal article grew out of control, and the book was hampered by the fact that I couldn't find enough information about one of the people I wanted to include. So I had one item too long to be a journal article, and another too short to be a book, both about autism. What could be more logical than combining them as two articles in one package?

The one complication is that the two contain common material. The section "Charles Lutwidge Dodgson: The Case for Autism" in *The Hidden Hall of Fame* is almost identical to the chapter "'A thought so dread, he faintly said, Extinguishes All Hope': Charles Dodgson and Autism" in *Alice's Evidence*. There is truly no reason to read both. So you can take any of several approaches:

- If you are interested in autism and autistics in general, read *The Hidden Hall of Fame* in its entirety, then skip to "He stole those tarts, And took them right away': The Accusation" in *Alice's Evidence*.
- If you are interested specifically in autistic friendships, the strange, intense, troubling relationships experienced by autistics, read *Alice's Evidence* in its entirety.
- If you are interested specifically in Charles Dodgson/Lewis Carroll, and know the details of his life in outline, read *Alice's Evidence* in its entirety.
- If you are interested in Dodgson and *don't* know his history, read the Introduction to *The Hidden Hall of Fame* and the opening section on Dodgson in that book, then skip to "He stole those tarts, And took them right away': The Accusation" in *Alice's Evidence*.
- If you want to read about some famous and important music-and-mathematics autistics, read *The Hidden Hall of Fame* and skip *Alice's Evidence*.

This book is really only a first draft. *Alice's Evidence* is mostly finished, but I had hoped to make *The Hidden Hall of Fame* much more complete. There are many more famous scientists, such as Albert Einstein and Henry Cavendish, who surely belong here (although my goal was to include only one example of each sort of "expression" of music-and-math-and-language autism). Many musicians, such as Ludwig van Beethoven, have been proposed as examples of the type. Several of us suspect that Francis James Child, perhaps the greatest scholar of folk music who ever lived, was autistic. Hans Christian Anderson has also been suggested, and Emily Dickinson. President James A. Garfield showed overwhelming signs of autism, and he was probably the most intelligent (though hardly the most successful) president in American history. Male autistics are more common than female, but there are some of the latter, and it would be nice to include them.

But to research all those people would take more time than I thought I had. Being myself autistic, I want people to see this work, and perhaps start to understand autistic friendships — and to eliminate the many vile speculations that have arisen about Charles Dodgson over the

years. More: I want people to realize that autistics are a very diverse group. This book is specifically about the sorts of autistics who specialize in music, mathematics, science, and language. There are good reasons to think that these autistics have other traits, in addition to their specialized skills, which are *not* shared with other autistics. I would hope to make it easier to find and recognize such people, and so give them the support they need.

There are two very deep lessons here. One is for the "neurotypicals" of the world — the non-autistics. It is that autistics are different — they have unusual emotions, and form very deep friendships, and deserve understanding and sympathy. The other is for the autistics themselves: That your friends probably *won't* have the same feelings as you do, and you need to respect that, and *ask* how to behave, so that the friendships can remain friendships. In the long run, this will be better for both of you.

If you are wondering about the rather poor poems that precede each book, I can only advise you to consider how Charles Dodgson dedicated his books....

In addition to the dedicatees, I owe many other thanks. Like many autistics, I'm a lone wolf, so I didn't get much research help, but I owe thanks to my parents, Dorothy and Frederick Waltz, for reference materials (among other things). Paul Stamler is most responsible for getting me to finish this thing. Ed Cray and David Engle also deserve credit for that. Don Nichols made suggestions about Alice's Evidence. Benji Flaming gave me another perspective on autism. Dr. Barbara Luskin helped me make sense out of many strange aspects of autism. And then there are the special friends from whom I learned so many lessons. Many of the lessons I learned were painful. But maybe you can learn them from me and be spared the pain. In the order I met them: Sally Amundson, Carol Anway, Barbara Edson, Mathea Erickson Bulander, Catie Jo Pidel, Elizabeth Rosenberg, Patricia Rosenberg, and "Sarah Jane."

May they live in a world in which all people find their skills and gifts fully appreciated!

Robert B. Waltz August 2013

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# The Hidden Hall of Fame: Four Autistics Who Changed the World

by Robert B. Waltz

# To Elizabeth Rosenberg Catie Jo Pidel Patricia Rosenberg

Who showed me where I was wrong and to

Sarah Jane and her son

wherever you are
in hopes it may help make a better world for them

Eyes so wide with wonder Looking for the key, In the tongues of others Zealously she sees A tale with hidden meaning Battling to be free.

Ears will hear the story
Told where'er she goes;
How many other hearers
Rejoice in what she knows!
Oh, can we ever match
Such a blooming rose?

Ever may she tell the tale, New words for the old, Bearing on her journey Each precious word untold, Roving the world over Giving gifts like gold.



Passing minstrels tell a tale,
A tale of joy and love,
That is carried on the wind
Rung down from high above.
I would tell you this story,
Carried by flying birds,
It is a tale of treasure—
A treasure beyond words.

Read to me this story,
Oh, may it come to you!
Send this joy upon her;
Ever may it come true.
Now may your heart be joyful,
By land and sea and air,
Even amid the sorrows
Real folk ever must share,
Guard her from every care!

#### Preface to "The Hidden Hall of Fame"

It was clear from the start that I was different. I was slow to start to talk. I had trouble learning to tie my shoes, and to tell left from right. In elementary school, I had no friends. My parents were advised that it was not safe for me to go to a public junior high school; I simply did not have the defenses to deal with the bullies. My first time in college, I flunked out, despite what was, by every other measure, extremely high intelligence.

My parents persisted. They pushed me back into college, and this time, in a slightly different environment, I was able to earn my degree and go on to gainful, if not lucrative, work. But I still wasn't really right. In my thirties and forties, my life stagnated; I had lost my college friends, and had no ambitions, no plans — really, no life. My health deteriorated, but I did nothing. I did not find my own home until my parents forced me to. I watched as my income slowly fell.

It was not until I was forty-nine that circumstances changed. I met a person who caused me to try to take more control of my life — and I heard a story about Asperger's Syndrome (high-functioning autism, as it is now called) that described a condition very like mine.

I investigated, and it became quite clear that I did indeed suffer from Asperger's or something like it. In 2012, at the age of fifty-one, I was formally diagnosed as autistic.

So I finally had a name for what I suffered. But I had no cure. There is no cure for autism. All we can do is try to alleviate the effects. Hard to do, in my case — in the process of learning who and what I was, I had lost my job, and had formed and destroyed two friendships that meant a great deal to me. As a matter of fact, the only two close friendships I had.

As I fought through these problems, I sought to find people who were more like me. The obvious place to seek them was among other autistics. And yet, I found that I was no more like most autistics than I was like "neurotypicals" — ordinary people. If anything, I was *less* like them.

Which is extraordinarily odd, because the people I liked best — the handful of "special friends" who reshaped my life — had strong autistic traits themselves. In other words, my favorite people were autistics, and yet I didn't care for most autistics.

Autism is a very complex condition. The definition is of a disorder involving the emotions and social interactions — people with autism have a lot of trouble understanding other people. But the way to think about it is that the brain has been rearranged. In autistics, much of the processing power that normally is devoted to social interactions is devoted to — something else. *And that something else varies from autistic to autistic.* Most autistics have some area in which they are particularly good, even though they are likely to be very bad at life skills and areas outside their specialization: "[I]f we are not very, very good at something we tend to do it very poorly. Little comes naturally — except for whatever random, inexplicable, and often uncontrollable gifts we may have."

<sup>&</sup>lt;sup>1</sup> Page; full citation data lost.

It was Dr. Barbara Luskin who pointed out to me the logical consequence of this. Most people have similar abilities in most "typical" areas — that is, someone with average intelligence will have roughly average abilities in writing, mathematics, or art. It is not so for me; I am good at mathematics, and I hope you will find me a decent writer — but I can't draw for beans, and I hate small talk, and some forms of fiction are almost incomprehensible for me. Is there a pattern to this?

It was a comment of Temple Grandin's that resolved this contradiction for me. Grandin, who has met more autistics than almost anyone alive, believes that there are several common types. One of them is a group with particular skills in music and mathematics.

That is the key. *My* type of autistic is the "music and math" type.

Grandin does not mention language skills as a characteristic of this type. And yet, my close friends have included at least two extraordinarily gifted writers and at least three highly gifted linguists.

So perhaps there is a music-math-and-language type. Or perhaps the boundaries of the type are a little vague. The crucial point is that there is a kind of autistic to which I belong. What's more, many other autistics have belonged to this type — and some have accomplished very great things in their time. There is no hard-and-fast test for autism, so it is not possible to definitively prove that a dead person was autistic. But all four men profiled in this book had many autistic traits, and skills of the sort associated with my own music-math-and-language type. What sorts of work would you expect from people who naturally have special skills in music, mathematics, science, and language? Surely they would be musicians, scientists or mathematicians, linguists, or writers. I've picked one historical example of each type. So this book is an attempt to show what autistics can do — and also make a plea for understanding for those of us who try so hard and make so many mistakes. Perhaps, with a little help, we too can do great things....

## Introduction: What Is Autism? A Personal Perspective

Autism is a psychological development disorder characterized by difficulties in communication and understanding. Most authors on the subject, starting from that, go on to explain some of the characteristics of the condition — but I would rather give a more "mechanical" description.

The human brain is an incredibly complex mechanism, with different parts serving different functions. For example, in most people, Broca's Area and Wernicke's Area are responsible for speech — talking and listening with comprehension. Each part of the brain has certain tasks which it performs, and for which it is tweaked. We can see this by watching which parts of the brain "light up" in brain scans when a person performs certain tasks.

Brain scans of autistics show that their brains *don't* work this way. A job that, in an ordinary person, would activate a particular area of the brain may, in an autistic, be scattered all over the brain, or be redirected to a different area. *Which* area varies from autistic to autistic. If the ordinary brain is a finely-tuned mechanism for performing the role of being part of human society, the autistic brain seems almost to have been assembled from a kit by someone who was unable to understand the instructions.

But now imagine that you are assembling that kit just by trying to guess how the pieces work. Say it's a prefabricated house. A lot of things will go wrong as you put it together. The roof might leak or have holes. The rooms will be the wrong sizes. If it's electrified, you may not be able to make all the electrical connections. But *some* parts are very likely to end up bigger and better-furnished and more attractive than in the "standard" house.

That's the way it is with autistics. A lot of parts are damaged or messed up. But there is usually some special part that gets a whole lot of extra brain power and ability. It isn't usually talked about, except as a sort of obsession (the "special interest") or the rare "savant" ability, but almost all autistics have specializations — particular subject areas in which they are best. Often they will be very good at this one particular thing.

Temple Grandin has said that most of the autistics she meets fell into one of three categories. One of them, the music and mathematics category, is clearly the type I belong to. It seems pretty clear that most of my friends are also of this type — and while all of them have a strong interest in music (and most of them are skilled musicians), their other interests are not confined to mathematics and the sciences. The majority are also polyglots — one of them speaks six languages, mostly learned quite casually, and many of them are interested in linguistics. This particular type of autistic should really be the music/mathematics/science/language type.

Of Grandin's other types I can say little. I hope they can find their voices, but I am not the one to speak for them.

There are some traits shared by most autistics. I am not going to go into detail here; I'll bring them out by example as we look at various autistics of the past. But an overview is probably good.

The key aspect of autism is trouble with social relationships. Most humans have a strong sense of empathy — an innate ability to understand other people, and to sympathize with their emotions.

Autistics do not. Many have some sense of empathy, but it is much weaker or more limited than that of ordinary people. This means that we find it hard to tell when we are boring people, or when we should offer sympathy or comfort — or when we are asking for too much or applying too much pressure.

This produces social failures and insecurities; with them often comes a strong sense of anxiety. There is good reason to think that autistics are inherently more anxious than normal people — some people compare it to built-in post-traumatic stress disorder. But social failure makes the anxiety worse — and, often, the anxiety causes the social failures to be more severe, in an everworsening cycle.

There are two other failings associated with autism that I would especially highlight: trouble with decision-making and trouble with emotions.

The problems with decisions perhaps have "mechanical" causes. The pre-frontal cortex of the brain is responsible for decision-making — and, in autistics, the cortex often shows significant abnormalities. And so autistics have trouble with making choices. At least, that's what neurotypicals say is happening It doesn't feel that way to me. It's not that I have a hard time making decisions; it's more a case of *not realizing decisions need to be made*. There is a *lack* — a lack of volition, of "get-up-and-go," of the simple urge to say, "Something must be done about this." The tendency is to simply plod on, not confronting the situation, until disaster strikes.

The emotional difficulties may also stem from physical causes. Emotions are largely determined by the amygdala — one might think of this as the brain's "emotion mixer," responding to situations by sending out mood-causing hormones. And the autistic amygdala is again abnormal — meaning that it produces unusual emotions. Sometimes it's just a normal emotion at an unusual time. Many autistics are subject to "meltdowns" — sudden bursts of anger for what seem like trivial reasons. These at least can be understood. The other emotions... are harder, perhaps because normal people don't get these emotional mixes. For instance, autistics form very strong, very permanent friendships — friendships so devoted that they are often interpreted as being in love, or being obsessed. Speaking only for myself, I can say that I have repeatedly suffered from having my emotions misinterpreted — at the cost of jobs and friends and much of my life.

So the key to understanding autistics can often consist of admitting that we *can't* understand their (our, my) emotions in ordinary terms, and accepting they are different. As the great people in the following pages were different....

Each of the four parts that follows gives a brief sketch of the life of the person involved. This is not intended as a full biography, and involves no original research. It's just to give you a feeling for the person's life. Then comes the evidence for autism. This will generally be fuller than the biography itself, because it involves a detailed look at who the person was. This is particularly true for the first part, about Charles Dodgson, because I am using him to illustrate most of the leading effects of autism.

### The Writer: Charles Ludwidge Dodgson

Sentence first — verdict afterwards.

Charles Dodgson ("Lewis Carroll"), Alice's Adventures in Wonderland, Chapter 12.

#### Who He Was

Charles Lutwidge Dodgson was born on January 27, 1832, the third child and first son of Charles Dodgson (II) and his first cousin Francis Jane "Fanny" Lutwidge. Eight other children would follow. Dodgson's father had been an extremely gifted student at Oxford, but at this time was serving an impoverished parish in Daresbury, Cheshire.

In 1843, the Dodgson family moved to Croft Rectory in Yorkshire, a much better living. Soon after, young Charles left home for school for the first time; he attended the nearby Richmond School, where he was a successful student of classics. In 1846, he was transferred to Rugby School. This was a miserable experience for him; he seems to have suffered significant hazing. Still, he managed to do well academically.

In 1850, he was admitted to Christ Church College of Oxford University, his father's alma mater. As it turned out, he would spend the rest of his life there. He continued to study classics — but also began to seriously study mathematics, at which he showed even greater aptitude. When he earned his bachelor's degree in 1854, it was with first class honors in mathematics but only second class in classics.

Shortly after that, the old Dean of Christ Church, Thomas Gaisford, died. His successor was Henry George Liddell, a distinguished scholar who, with Robert Scott, had published a *Greek-English Lexicon* which was so authoritative that it remains the standard reference for classical Greek to this day.

This event was to prove pivotal to Dodgson in two ways. For starters, in 1855 Dodgson was appointed the new Mathematical Lecturer at Christ Church. But it was the family of Dean Liddell which would influence him the most.

Dodgson was fascinated by gadgets and inventions, and in April 1856, he was studying the still fairly new, and difficult, art of photography. The Deanery of Christ Church was a handsome building, and Dodgson tried to photograph it with his friend Reginald Southey. Unfortunately, the photos did not turn out well — but Dodgson spent enough time there to meet the three daughters of the dean, Lorina, Alice, and Edith Liddell. It was a fateful meeting; they would, over the next seven years, become his very close friends.

Dodgson had always had the urge to write, and especially to write humor and nonsense. Even as a boy, he had hand-edited a series of "magazines" at the rectory. Now, as an adult with a steady job, he began writing for publication. In May 1856, he offered "The Path of Roses" to editor Edmund Yates — but he wanted to write under a pseudonym. After some negotiations, they agreed on "Lewis Carroll" — a Latinized version of "Charles Lutwidge" with the names reversed. It would come to be a far more famous name than "Dodgson."

In 1857, Dodgson earned his Master of Arts, which was the highest degree he ever received. He continued to teach mathematics. In 1860, he published his first monograph, *Notes on the First Two Books of Euclid*, an instructional text.

Dodgson was also studying for the priesthood. At least officially; it was a requirement for his academic position. But he doesn't seem to have liked the idea. In 1861, having little choice, he was ordained a Deacon in the Church of England — a significant position in the Anglican Church. But he never went on to become a minister, even though that required him to get what amounted to a special waiver from Dean Liddell.

Although a handsome young man, Dodgson seems never to have sought a wife in this period. There is no sign he even thought about it. Insofar as he had a social life at all, it involved children — and especially the three daughters of Dean Liddell. During the summers, they often went on trips, or boating on the Thames. On one of those trips, in 1862 (perhaps July 4, although the date is somewhat uncertain), he told the three girls a tale in which he sent Alice plunging down a rabbit hole into a very strange world inhabited by talking caterpillars, animated cards, and a grin without a cat. Alice, the second daughter, liked it so much that she urged him to write it down.

It would be a very long time before she saw the result, and by that time, their relationship had changed utterly. We do not know why, but on about June 28, 1863, Dodgson was cut off from the Liddell children. The estrangement was not absolutely complete, but there were no more trips, no more gifts, no more storytelling. Some have suspected Dodgson of being in love with Alice, and perhaps trying to propose. More likely he made a social gaffe, and the parties blew it out of proportion until reconciliation seemed impossible. Whatever happened, Dodgson clearly remained devoted to Alice (and, probably, her sisters), but was not allowed much contact.

An ordinary person might have sought to change his life in some way after that disappointment. Dodgson did not. He continued his work at Christ Church — and continued to work on Alice's Adventures. He worked up an manuscript of the story, which he eventually gave to Alice — but he also showed it around, and was told that it should be published. He padded out the story, and hired John Tenniel to illustrate it. It was published in 1865 as *Alice's Adventures in Wonderland*, and it became a worldwide hit. In 1871, he published a sequel, *Through the Looking Glass*.

After a few minor moves around campus, Dodgson had been granted in rooms in Christ Church's Tom Quad. He kept those rooms for the rest of his life — thirty years without ever changing his residence. But there seemed to be a dark stain on his soul. For years, we see signs of depression and sorrow in his diary. He was, in his view, worthless, selfish, flawed.

He tried to work it out in the only way he knew: By spending more time with children. He avoided adult social functions; he hated small talk. He made no attempt to seek a wife, nor did he try to achieve ordination as a minister. In 1876, he published his nonsense poem *The Hunting of the Snark*, but his muse was falling silent. He published mathematics books and political pamphlets, but no more fiction until his disastrous failure *Sylvie and Bruno*. Meanwhile, Alice Liddell had married Reginald Hargreaves, and although Dodgson kept sending gifts and letters, the friendship seemed never to revive. In 1881, he resigned his post as mathematical lecturer and contented himself with the income from his writing and other small jobs. He also watched over

the rest of his siblings after their father's death in 1868. He often visited them, and it was on one of those visits that he took ill with pneumonia. He died of it on January 14, 1898. He was buried with little ceremony, and Charles Dodgson is almost forgotten, except as a member of a freak show. But the *Alice* books live on.

It was, without doubt, the life of an eccentric. Was it the life of an autistic? This is, of course, what we want to learn. The case is presented in the next section. This is the longest chapter in the book, because I will also be using it to demonstrate some of the characteristics associated with autism and Asperger's Syndrome.

#### The Case for Autism

On November 11, 2011, I conducted a Google search for "Lewis Carroll" and "Asperger's [Syndrome]."

Google came back with more than half a million hits.

With so many sites to sift through, I wasn't able to find out who originated the suggestion that Dodgson was autistic — if, indeed, anyone knows. Clearly the idea is widespread. It obviously is not possible to diagnose a man who was almost half a century dead when Leo Kanner and Hans Asperger published their research, but the evidence is worthy of a detailed look. If Dodgson wasn't on the autism spectrum, he should have been.... The list below summarized the various autistic traits shown by the author of the "Alice" books.

Those who are not autistic should understand that there is no one trait in the list below is considered diagnostic for autism (indeed, there really *is* no single diagnostic trait for autism), but the characteristics listed are often associated with its victims.

Mathematical inclination. Dodgson was a professional mathematician — he seems to have been a mathematician born. His family loved to tell a story about how Dodgson, as a small boy, pestered his father to explain logarithms to him. Although he never earned a doctorate, his credentials were significant: He was first in his class in mathematics in 1854, by a significant margin, and was one of five students earning a First Class degree. The range of subjects he taught was diverse; in his first full year as a tutor, he had students studying differential calculus, conic sections, trigonometry, and "Euclid and Algebra." Although most of these are subjects now taught in high school, it would be a rare school where a single instructor was prepared to teach them all. It was none other than Dean Liddell, the father of Alice Liddell, who appointed him to his mathematics lectureship.

Tony Beale wrote an article, "C. L. Dodgson, Mathematician," which denigrates his talents (while admitting that he was handicapped by being at Oxford when all the best English mathematicians were at Cambridge<sup>8</sup>). What Beale really demonstrates, however, is Dodgson's conservatism in established matters. Dodgson was fundamentally sound, and was often creative in areas not heavily explored.

<sup>&</sup>lt;sup>2</sup> See, e.g., Carley, p. 41.

<sup>&</sup>lt;sup>3</sup> Kanner was responsible for first describing autism, while Asperger described what came to be called Asperger('s) Syndrome but is now listed as simple a form of autism. Both did their primary work in the 1940s.

<sup>&</sup>lt;sup>4</sup> ClarkCarroll, p. 18.

<sup>&</sup>lt;sup>5</sup> WilsonR, pp. 51-52.

<sup>&</sup>lt;sup>6</sup> WilsonR, p. 61

<sup>&</sup>lt;sup>7</sup> Included in Norton, pp. 294-302.

<sup>&</sup>lt;sup>8</sup> Norton, pp. 295

Dodgson began his mathematical career as a lecturer at Christ Church college in 1855, spending the rest of his life at Oxford. He only once changed jobs in his entire life, giving up his teaching post to write and take such odd jobs as curator of the Christ Church Common Room. 10

Although not all autism victims are good at mathematics, "We... recognize that the personalities of some of the great mathematicians included many of the characteristics of Asperger's Syndrome." And on tests of relationship between autism and mathematics, "The correlation between math and autism and/or Asperger's was proved again; mathematicians scored higher than other scientists [on tests for autism], who scored higher than students in the humanities, who scored roughly the same as random controls." 12

Dodgson's work was solid although too conservative to contain major breakthroughs<sup>13</sup> — but it is noteworthy that one of his private examples actually anticipated von Neumann's and Morgenstern's creation of game theory by half a century, when he tried to create a "utility" system for measuring and comparing pleasure by creating a unit based on eating a particular food.<sup>14</sup> Dodgson may have had other hints of game theory; scholars find the forerunner of the two person zero-sum game in his work on voting theory.<sup>15</sup>

Dodgson's one real defect as a mathematician, apart from his failure to pursue the implications of some of his better ideas such as the utility system, was his rigidity in certain areas. His insistence on doing plane geometry just the way Euclid did it was a real limitation. Reading about this is very reminiscent of the autistic trait of insisting on exact terminology — e.g. Liane Holliday Willey's insistence as a girl that she could not take a nap on her mat, because she did not *have* a mat, because the item she had been given was a *rug*. 17

Dodgson was "an exceptionally capable and dedicated scholar who nonetheless lacked fundamental creative mathematical genius. Had he only mapped out for himself a career in logic, an almost uncharted sphere... his ultimate scholastic achievement might have been considerably greater." <sup>18</sup>

There is only one exception to his record of successes (which included several mathematics prizes), <sup>19</sup> but it is revealing. He was hoping to become the Mathematical Lecturer at Christ

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CollingwoodLife, p. 24 (chapter II). Woolf, p. 39.
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<sup>&</sup>lt;sup>10</sup> Woolf, p. 276.

<sup>&</sup>lt;sup>11</sup> Attwood, p. 240.

<sup>&</sup>lt;sup>12</sup> Gessen, p. 176, citing Simon Baron-Cohen.

<sup>&</sup>lt;sup>13</sup> See the article by Beale cited in note 16.

<sup>&</sup>lt;sup>14</sup> Woolf, p. 48, although — as a non-mathematician — she does not observe the very great potential significance of Dodgson's idea. Sadly, he expressed it in a letter to a friend, Edith Denman, rather than in a mathematical publication, so no one followed up on the idea.

<sup>&</sup>lt;sup>15</sup> Cohen, p. 428.

WilsonR, pp. 81-97, although this attempts to justify Dodgson's conservatism.

<sup>&</sup>lt;sup>17</sup> Willey, p. 23.

<sup>18</sup> ClarkCarroll, p. 69.

<sup>&</sup>lt;sup>19</sup> Stoffel, p. 18.

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