Knowing the Unknowable: Putting Psi to Work by Damien Broderick. Vancleave, MS, USA: Surinam Turtle Press, 2015. 274 pp. $20. ISBN 978-160543861-0.

Damien Broderick provides a lucid, engaging, and challenging description of how we might increase the "signal-to-noise" level of clairvoyance, telepathy, psychokinetic, and precognition effects so that they could be put to practical use to benefit humanity. Anyone working in psi research or applications should own and read this book. For those not working in the field, *Knowing the Unknowable* will be a valuable addition to the library of any statistician, psychologist, science historian, or student of psi who is motivated to learn more about the history of psi or understand how regularities in human responding can be used to help increase effect sizes derived from any behavioral dataset.

In *Knowing the Unknowable,* Broderick starts us off with a clear message that here we will not be concerned with dreamy folktales of psi experiences. Instead he offers to steer us through the details of a series of almost-forgotten psi experiments that elicited large numbers of guesses at targets unknown to the guessers. Before we get there, however, Broderick gives us something rare in the world of scientifically rigorous work. Before we have to do the work of understanding the intricate details of what he is going to tell us, he tells us stories. Sure, he may have an unfair advantage compared to us academics because his Ph.D. is in science and literature, and he has written an intimidatingly large number of science fiction books. But it occurs to me that those of us who write academic prose regularly might still consider imitating Broderick's methods. After all, most of our readers probably need to be motivated by something other than intellectual curiosity to finish reading our work—our readers need to be emotionally involved to get over the challenging hurdles we invariably give them.

So, in tribute to Broderick, I'll tell a brief story about a completely fictional psi researcher named Jubulia Mossberg.

<warning: totally fictional story>
After packing her son off to school and unloading the still-dirty dishes from the dishwasher that fails spectacularly every time, Dr. Mossberg set about relaxing on her green chaise longue and reading her new book,

Knowing the Unknowable. She was at first struck by the clarity of prose as well as the obvious ability of the author to anticipate and address the likely skepticism of the reader. Upon finishing the Introduction, she realized that the author wrote in a roundabout fashion, in that he first mentioned terms and ideas briefly without explanation, but just when she became concerned, an explanation appeared. The method mirrored the cover of the book, which featured a complex 3-D geometric spiral shape. Once she adapted to this style, the book became a joy to read. By the end of the work, just before her son would return from school, Jubulia was filled with new ideas about how to re-analyze some old datasets to better understand precognition. She launched into this re-analysis and indeed found a critical effect that she had previously ignored. Shifting her point of view, she wondered if the entire book consisted of instructions on how to go on a fishing expedition for psi effects. Just when she was about to resolve this concern, Mossberg's son walked in and announced that he was home and thus the media should be alerted.

    <end: totally fictional story>

    Hopefully this story worked like Damien's stories in *Knowing the Unknowable*, making you ask how the fictional Jubulia found a new effect in the old datasets and encouraging you to read on. However, I lack Broderick's expertise as a science fiction writer, so it's also possible that you just found yourself asking why this strange character uses a dishwasher that clearly fails at its one and only job. Either way, you're hopefully willing to keep reading because you've got one or more questions to get answered.

    Broderick's brief stories all pose the question, "What problems could we solve if we actually had useful psi applications?" They suggest how we could communicate with political detainees locked in isolation, accurately locate underground mineral deposits without expensive equipment, predict a devastating terrorist strike, and more. However, Broderick rightly points out that there is so much variability in psi data that these practical and desirable outcomes seem fantastical. The essential point of the rest of the book is that we ought not to let this variability and "noise" deter us. Instead, we ought to isolate the effect we are interested in by using either pre-tested skilled participants or massive sample sizes, asking each participant to guess multiple times at the same targets, and effectively removing known response biases that contribute to the noise by using normalization procedures.

    Broderick describes in detail several large experiments that I had not heard of prior to reading his book. In 1928 a radio experiment in telepathy received 123,295 responses from 24,659 participants who were trying to guess at the objects being considered by a group of sequestered

"senders." From 1937 to 1938 the Zenith radio network broadcasted an ongoing experiment in telepathy using symbols as targets, receiving more than 150,000 responses. Beginning in 1954 and going on for more than a year, two researchers gathered more than 35,716 responses in a telepathy experiment using clock faces as targets—all of the responses in this last experiment were delivered *by mail*. Today, that seems more fantastical to me than psi.

What do these telepathy experiments have in common beyond a massive number of respondents? Well, they were all dismissed due to inherent biases in the datasets. The data were originally analyzed with an approach that quickly begins to seem simplistic to any reader of Broderick's book: The researchers looked for either particular participants who performed above chance or a majority vote that predicted the target above chance.

Initially, some experiments revealed psi with this approach. However, further analysis revealed that simple human bias was the explanation for the effects. For instance, in the Zenith network experiments a clear bias emerged, so that participants faced with a binary choice (e.g., square versus circle) were significantly more likely to report a pattern of guesses square–square–circle–square–square (or its inverse) than any other pattern. When the actual pattern of targets matched this pattern, there was apparent evidence for a whopping psi effect, all based on this consistent bias. Yet another psi hypothesis is proven to be the result of response bias. Alas.

But here is where Broderick provides a key insight. If psi exists, it should appear despite any response biases. As he poetically states, "If there is any psi in the data, it will bob up on top of that pattern like a cork on an ocean wave" (p. 79). In the remainder of the book, he shows us, by re-analyzing these old experiments as well as 141,341,969 more recent lottery entries, how to find this cork.

The method is conceptually simple. First, look at the data carefully to observe any clear response biases that produce a pattern that differs consistently from chance in the same way each time the experiment is performed (like the common choice of the number "3" when someone is asked to pick a number between 1 and 10). Second, take this biased response into account by normalizing the data to the expected response rate for each guess. Third, look at the new normalized data to see whether the majority of guesses now correspond to the target.

For instance, let's assume on a daily "Guess the number I'm thinking of, between 1 and 10" experiment, on average across multiple days "3" receives 20% more guesses than any other number. So if the target is "5" on a particular day, and "5" receives 900 responses on that day even though on average it receives 800 guesses, and "3" receives 960 responses on that

day, and all the remaining numbers between 1 and 10 receive 800 responses on that day, we have potential evidence for psi. This is not because "5" received the majority of guesses (it didn't), but because normalized to the expected average number of guesses for "5" across days (800), there was a 12.5% increase in guesses for "5" on this day when "5" is the target. This is *potential* evidence for psi because it would have to be repeated multiple times to be impressive. Regardless, performing this normalizing procedure for each target ends up, in many cases, revealing relatively impressive and consistent results where none were thought to exist.

After taking us through this process using multiple datasets, Broderick then speaks to two additional factors that might be taken into account to increase the "signal-to-noise" ratio even further: Individual differences that can conspire to produce null results and phasic environmental conditions, such as geomagnetic effects. Both considerations may be important in winnowing out noise and understanding the mechanisms of psi, but as the examples cited by Broderick make clear, many more experiments need to be performed in this vein before it is clear which individual differences and phasic environmental conditions need to be taken seriously. Of course, one problem with taking the individual differences/environmental conditions results too seriously too soon is that drawing conclusions based on a small number of experiments can send the whole field into a dead end that could have been avoided by performing multiple confirmatory tests for these hypotheses.

Knowing the Unknowable ends on a hopeful, fun note: a brief recipe for do-it-yourself applications of psi. The very first suggestion on the list of considerations for such an adventure is to pre-screen participants to find at least one psi-talented person. This suggestion can seem to invalidate the mass-testing approach, but instead Broderick explains it as a best-case–scenario idea: One might get many psi-talented people and ask them to make repeated guesses at targets. The other considerations range from the at-this-point obvious (draw conclusions from normalized rather than absolute numbers of guesses) to the innovative (code the target 10010111 as also 01101000 to help reduce response bias; if a participant is more likely to guess a "1" than a "0", responses to these two can be compared to find the psi floating above the bias). The entire recipe, as a whole, has yet to be tried. But I am impressed with how it smells, even in print.

I have two minor conceptual concerns with the material in the book. Although open-response remote viewing is discussed at first as a way to give credence to the hypothesis that psi is real and later in more detail as an alternative protocol, most of the book is focused on analysis of forced-choice datasets in which the target is known to the guesser to be one of

two or more options. Broderick admits that even after using his normalization approach, the results from forced-choice datasets are not likely to be as good as those from remote viewing experiments with highly skilled viewers. This point left me wondering why we don't just put our collective research effort into finding skilled remote viewers.

The second conceptual concern was shared by Jubulia Mossberg, the fictional researcher I described earlier. While reading the book, a fear lingered in my mind. What if it is all just an elaborate discussion of how to mine data to find a result? After all, the normalization method doesn't "work" to show a psi effect in every case, and at certain places in the process Broderick appeals to psi-missing (scoring significantly incorrectly on a psi task) as a legitimate form of psi, while in other places when there is no evidence of psi-missing, psi-hitting is discussed without reference to psi-missing. And almost any of the differentiating factors described in the book, including cognitive style, mood, and environmental changes, could be used post-hoc to explain a pattern of results.

What saves the book, in my view, is that Broderick knows this. He makes it clear that he hopes researchers will take these ideas and perform multiple confirmatory experiments to test them. More than that, it is clear that he hopes that the ideas will lead toward new and helpful practical applications of psi. These are two worthy goals, in my view, and any amount of data mining justifies useful insights that can lead to confirmatory experiments and applications that work.

Oh, speaking of the fictional researcher, here are the answers to those burning questions you should have. I'm not sure what Dr. Mossberg found in her data, because unlike me she is quite shy. But I do know why she uses the dishwasher even though it doesn't work. It's just her human bias. The dishwasher is supposed to work, she expects it to work, and life seems irrationally better when we stick to our biases, no matter how incorrect they are.

Finally, if I were writing a warning label, I might place a stronger caveat on this book than Broderick does in his second chapter. In that chapter, he warns the reader, "You will find some numbers in this book. Tables of them
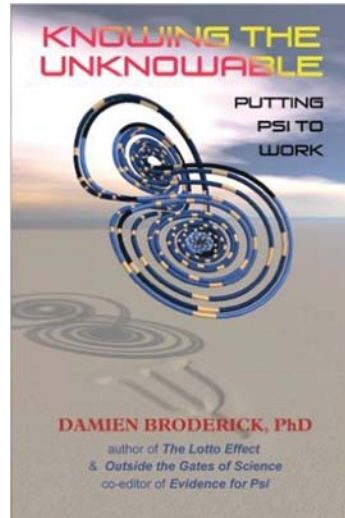
in many chapters. . . . Don't be alarmed" (p. 17). I might phrase it somewhat differently. Perhaps, "When you read this book, you will start out feeling like a little kid opening a package of sour apple Jolly Rancher candies, and by the end of the book you'll realize that the green dye that caught your eye wasn't 'sour apple' but spinach. You'll eat it anyway, because you already opened the bag. Besides, it doesn't taste that bad. And in the end you'll feel more satisfied than you have felt in a while, and although you might get a bit annoyed at the author for tricking you, you will appreciate his effort in providing a challenging, healthy, and mentally filling treat for a change."

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