PSYCHOPHYSICS:
An Answer from the Unconscious

ABSTRACT

Biopsychology, and more specifically psychophysics are explored in relationship to information obtained from the unconscious with a meditative practice. Problem-solving methods and related principles of living in harmony with the cosmos without trying to manipulate the future for physical, emotional, or mental gain are presented through the experiences of one meditator.

INTRODUCTION

Biopsychology, and more specifically psychophysics, became the central focus for Elmer Green as he was moving toward obtaining a Ph.D. at the University of Chicago. His dissertation process included getting information from the unconscious and most particularly his own Higher Mind which he came to call "Mind-of-Me." His problem-solving methods at that time reveal principles and practical methods which have broad implications for anyone pursuing solutions to many kinds of problems across a wide range of human endeavors.

Green had already become thoroughly familiar with a practice of meditation through a non-structured "Mindfulness Training" program in which he had learned what is known in Southern Buddhism as Vipassana Meditation. As he reports,

> More importantly, at the same time, under The Teacher's guidance, I surrendered my egoic willfulness to the Will of Mind-of-Me [*MOM*]. I gradually learned to live in harmony with the cosmos without trying to manipulate the future for physical, emotional, or mental gain. This is easy to say—but it took 20 years to learn.

The story unfolds in Green's own words as told by selections from his new book, *The Ozawkie Book of the Dead: or Alzheimer's Isn't What You Think It Is*, published by the Philosophical Research Society.[1] *[Eds.]*

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The most important instance at Chicago of input from *MOM*, came in two parts, the first one before I received my Ph.D., and the second after. The molasses-mind phenomenon came back in the first part, and by the time that problem was resolved I'd learned that the *true source of creativity in me* and also, I believe, in everyone on the planet—far beyond computer-like combinations of neural processes in brains—is in *MOM* consciousness. In my case, the *MOM* level of Mind forced me, against my personality will, to solve a psychophysics puzzle that no one in history had previously solved. This "no one in history" involves an important theoretical point, for paradoxically it

implies that "that which will be known *at some future date" is* already available to our mind, right now, if we get into "the right frame of mind," so to speak.

Psychophysicists had been arguing about mathematical contradictions in theory and data for 101 years, and *MOM* settled the argument, proving that both sides were right, and wrong. And in addition to ending the debate, what I learned was: (1) either *MOM* understood more about psychophysical equations than anyone on the planet, or *(2) MOM* could read what was going to be written in the akashic record.

BACKGROUND: My Ph.D. research consisted of finding a relationship between a changing pain threshold of the skin (the minimum amount of electrical shock which could be detected in the skin over the elbow bone), and increasingly-intense physical activations of other sensory systems—auditory, visual, and vibratory. The "switchboard theory" of pain detection postulated that during intense stimulation in audio/visual/vibratory systems, the threshold for skin pain would *increase* because the "switchboard" would be busy. That is, fewer brain circuits would be available for pain detection.

[Without going into detail, this "switchboard" theory proved to be wrong. Pain threshold was found to be a function of where a subject put his or her "attention." Those who focussed attention on the skin became more sensitive to skin pain despite the fact that other senses were intensely activated, whereas those who focussed attention on auditory or visual stimulation became less sensitive to skin pain. This may seem obvious to the reader, but obtaining rigorous mathematical relationships in this kind of research isn't easy, That, of course, makes it wonderful for graduate students, otherwise they might not get their Ph.D's.]

The above research was basic *psychophysics,* which is defined in mainstream experimental psychology as the field of mathematical psychology in which one investigates the relationships between measured physical intensities of external stimuli and reported sensitivities. For sensory professors who thought that Psychology would eventually become a branch of Physics (which in '60 was the prayed-for goal of most everyone I knew in Biopsychology), psychophysics was the ivory-tower of psychology. It, as successfully as Noah's Ark, they hoped,

would keep Experimental Psychology above the swirling flood of ambient psychiatry and clinical psychology, and the more-dangerous swamp of parapsychology.

Few psychologists actually worked in psychophysics, though, because they hadn't studied mathematics. Not that the math was unusually difficult, but except for statistics, psychologists were seldom trained in the "hard" sciences, in which the language of partial-differential equations is a common dialect.

As a scientific discipline, psychophysics was developed in 1860 by German physicist, Gustav Fechner. His book, *Elements of Psychophysics* (1966, c 1860), was the dominant force in the field for 100 years.[2] Then S. S. Stevens of Harvard published an article in *Science* titled, "To Honor Fechner and Repeal His Law," and later was awarded a thousand-dollar prize for his work in the field.[3]

After that paper was published, it was assumed by most researchers, including me, that Fechner's "logarithmic law" of sensory discrimination was out, and Stevens "power law" was in. So in designing my equipment for increasing the intensity of both auditory and visual stimuli so as to produce 10 equal *sensory* steps I used Steven's "law" to determine the intensities of the 10 *physical* steps.

But when I ran preliminary trials with a few subjects, my equipment didn't work. Even though subjects could easily discriminate the first four steps upward in sensory intensity, after the sixth step no increases in loudness or brightness were noticeable. What a predicament! In designing and building my instrumentation I'd followed the equations of the world's leading authority on sensory scales, but something was wrong. Worst of all, it had taken so long to build and test the research gear that I had only seven weeks left in which to modify my equipment, run subjects, do data reduction, and write my Ph.D. thesis.

So, in desperation I decided to follow the procedure of many researchers before me in this field, and run a group of college sophomores through my procedures and keep adjusting the *physical* intensities empirically (that is, "by hand") until the students agreed that the 10 increasing *sensory* steps were approximately equal.

But the moment I decided to do that, the familiar cold-molasses effect of the *mental-relay* project took hold of my mind.

I was exasperated. I complained to *MOM*. This was no inconsequential mental relay I was working on, I said, *this was my Ph.D.*, on which I'd worked for four years—and as The Teacher's employee, to boot. *So I* demanded that the effect be released, and I would start contacting students immediately. After all, I argued, if the sensory steps weren't exactly equal when determined by student estimates, it made no difference anyway, for I was studying pain threshold, not the sensory "law," and small deviations from the curve would not be statistically significant.

Then in my blanked-out mind the words hypnagogically formed, "Go to the library." Surprised at that, I asked why. And the instruction came back, "Learn everything about Stevens."

Now that, I thought, was *really* useless. I'd already found that the "power law" was wrong for what I was doing. So—I tried to slog ahead anyway and ignore what *MOM* said. But I couldn't make my mind work. It was like suddenly having an IQ of about 75. So I called *MOM* again. And again I got the response, "Go to the library."

Maybe I'd been working too hard, I thought. If I went home and slept an entire night without reading either Stevens or Fechner, or anything else, and ate some ice cream, perhaps I'd be okay in the, morning. So home I went.

But when I sat down at my desk the next day, the molasses effect came back. Finally, disgusted, I said to *MOM*, without bothering to get into a respectful mood, "All right! I'll do it! I don't know what for, but maybe you do. Whatever the reason, I hope it's a good one, because if I don't get my Ph.D. on time and run out of money, it'll be your fault." And all I got in response was, "Go to the library."

So I went, and began reading everything that Stevens had written in the field of psychophysics. And after a couple of weeks of study, and making graphs of visual "power law" experiments, I noticed, when I finally assembled them all on a single sheet, that at a certain place on each of the "power law" lines,

Stevens had noted a "terminal brightness point." And when I connected all these points together in a single curve, I got Fechner's logarithmic discriminability "law." Astonishing!

On analyzing Stevens' research results further, it became clear that in contradicting Fechner he had made a monumental *operational* blunder. He hadn't replicated Fechner's carefully-specified experimental conditions, but instead had run his experiments in an entirely different way, without taking into account the operational differences.

Fechner's work was aimed at finding out how much brighter a light had to be in order to show a "just noticeable difference," a JND. And all subjects were adapted to a stimulus before being asked to detect a JND. Stevens, on the other hand, momentarily flashed a bright light on a screen, often dozens of JNDs brighter than the initial brightness of the screen, and then asked the subject to estimate on a scale of 1 to 100 how bright the flash had been, compared to the initial brightness.

In other words, none of Steven's subjects were adapted to the brightness of the light before they ranked its sensory impact. Steven's condition was like coming out of a dark movie theater into blinding sunlight, which doesn't look so bright, however, after you've adapted to it (Fechner's condition).

To cut the story short, I saw that a single more-general "law" could encompass both Fechner's and Stevens "laws," and that somewhere in the general equation, "adaptation time" (t) would become a factor. When (t) was one second or less, the power law held. When (t) was as long as a few minutes, in a slowly ascending series of intensities, as in my research, Fechner's law held.

When I rewired my audio and visual equipment to take adaptation into account, all 10 non-equal increases of *physical* intensity gave equal increases in *sensory* intensity. Great!

Completion of my dissertation wasn't delayed, though it was touch and go for a while. In 10 days I ran all of my research subjects and collected polygraph records. In a second 10-day period a hired crew of medical students performed

data reduction and made graphs for me. And in 10 more days I wrote a 190-page thesis, had it typed by a professional, and turned it in—two hours ahead of deadline.

Interestingly, I'd accumulated enough subtle physical energy in my body so that twice in the last 10 days I typed for 36 hours without becoming sleepy, though I found myself doing a kind of breathing which I discovered later, in research in India, was used for accumulating etheric energy. In fact, during the final 10-day period, I slept only 20 hours. And shortly after my thesis was accepted by the Department of Psychology, May62, Alyce and I left for California on a vacation, and during this trip I noted that no ill effects resulted from the previous month's work. On the contrary, energy remained abundant and I was able to drive 15 hours a day without getting sleepy. How this anomalous energy state was brought about over the four years of graduate school, is described in Chapter 6.[1] [In the Ozawkie Book of the Dead. —Eds.]

The question that really puzzled me, though, was: How did *MOM* know that going to the library and studying everything that Stevens had written would solve the instrumentation problem in an elegant way? Or was one of The Teacher's group advising me? But even if the latter were the case, how did that Teacher know that the library was the place to go? Interesting question.

O n the other hand, Teachers and *MOMs* normally function at the Lotus level and above, and from that vantage point, events in the future aren't so obscure. The exact earthly "when" an event will happen is not easily determined from that level, though, I've learned, for space and time are artifacts of the physical nervous system, but details about "what" will happen often can be clearly seen.

My own precognitive *vision dreams,* in fact, have been indefinite about time, but often sharply correct about content. In one of the earliest of these dreams, at Hotel Boise in '44, 1 saw in symbolic format exactly what would happen to Alyce and me at the end of her life, and how we would navigate the *bardo,* but I had no idea that the event would be 50 years later. Also, even though the dream was one of the most vivid of my life, I didn't know the meaning of certain symbols, such as Alyce holding a baby in her arms. But I do now. [Discussed in Chapter 7 Of Ozawkie . . . —Eds.[1]]

It was a pleasure to refute Stevens because he'd said that Fechner, because of his interest in occult psychophysics (which is the other side of the psychophysics coin) had set the field of psychology back 100 years! What Fechner had proposed, which infuriated Stevens, was that not only does the world influence the mind, but the mind influences the world. It goes both ways, said Fechner. And he was right.

But for Stevens' world view, the mind-over-matter idea was dangerous nonsense. Interestingly, Fechner also said that scientists would not understand what he was talking about for another 100 years. He could have said 120 years, for only recently have mind-over-matter outside-the-skin articles and books begun to appear—and theoretical explanations offered.[4-10]

Incidentally, *matter*-to-mind psycho-physics and *mind*-to-matter psychophysics (the latter only now beginning to be studied mathematically) are aspects of a single field called **MIND**, which I understood from conversations with The Teacher, is the Kosmos. Patanjali, the father of yoga approximately 3000 years ago, expressed it thus, 'Everything consists of mind and its modifications."[11] In other words, matter and mind are interchangeable in the Kosmic sense—just as matter and energy are interchangeable in the Einsteinian sense. To me, this idea of mind-matter unity, no duality, a la Aurobindo and Tibetan Buddhism, is the ultimate monotheism.

Fechner had been impressed by H. P. Blavatsky's materialization phenomena in the 1880's (for a description of these materializations see Olcott, 1910), and had written to her for information.[12] He received long explanations in return. Fechner eventually proposed the existence of a "world mind," which I've referred to as the Planetary Field of Mind, and which Carl Jung called the collective unconscious. The way Fechner thought of it, our conscious mind is unaware of the general world mind because we are unaware of our own subconscious. Nevertheless, he said, all of us are extensions of "one mind substance." Interestingly, I didn't investigate Fechner's occult ideas until Stevens' sarcastic remarks aroused my curiosity.

Unaware of Fechner's esoteric ideas, I wrote an article for *Science* which synthesized the power and logarithmic "laws" of Stevens and Fechner.[13] Shortly thereafter I received a letter from Austin H. Riesen, Chairman of the Department of Psychology, University of California, Riverside, saying congratulations on making history in the field of psychophysics.

Another letter, though, said that my idea of a more-general "law" hadn't been proven because it hadn't been derived mathematically. Intrigued by that comment, I sat down, called on *MOM* to help with hypnagogic imagery and with equations (as in hydrodynamics at UCLA), and in a few weeks developed not only the general law, but some further ramifications. On writing it up, I sent the derivations in a very long article to *Science*. The manuscript came back by return mail with the explanation that different from "reports," only solicited articles were published in *Science*, and suggested that I submit the paper to another journal.

And now it's appropriate to say that I didn't follow MOM's instructions to the letter before sending the article to *Science*. What happened was that after deriving the general equation for the discriminability law, my mind became so fascinated and excited by the vista that was opening up, that it wanted to explore further, and show mathematically how the rods and the cones of the retina produce different psychophysical equations.

The very night after I realized where this line of thinking might lead, MOM communicated with me through a detailed dream, indicating that my view of further possibilities was not wrong. But, MOM advised, the article should be wrapped up *now*, after the first generalization. The reason: The first part, in which Fechner and Stevens were brought together, made a tight package that was small enough to be published. If I continued, however, the package would become very large and not as tightly tied together. In fact, it would be like having three packages loosely tied in one bundle. [That was the exact symbology.] If the big package was then sent to *Science*, it wouldn't fit—and would be returned. So—the advice went, it's better settle for half a loaf. That is what I was shown in imagery.

The next day I almost followed MOM's advice, but my mind and my "ego " stopped me. Psychophysics was *important* they said, and they wanted to keep going. Though uncertain about the wisdom of this deviation from MOM's advice, I kept going. The final word I got from MOM at the end was, it's a "tour de force, " but it won't sell. And the latter part, at least, turned out to be correct.

The next stop for the article, shortly after joining Gardner Murphy at The Menninger Foundation, was *Psychology Review*. But the reviewers for that

journal said bluntly that I was wrong, "Stevens has already shown that it could not be true." I replied to each objection the reviewers made and showed their errors. But the editor replied that psychophysics wasn't his field of expertise and he had to depend on the judgements of his people, and refused to submit the article to a new pair of reviewers who, I said, would be able to understand the mathematics.

Temporarily stymied, I asked Gardner for advice. He said that Harry Helson, a professor of psychology at Kansas State University, Manhattan, Kansas, was an adaptation-law theoretician and might be able to get the article published, so together we went to see Dr. Helson. His advice was to send the paper for an opinion to physicist Deane Judd in the National Bureau of Standards. He had been editor of the *Journal of the Optical Society of America* and was an expert in this field. I did this and received the following reply:

"Although this paper proved not to be easy reading, we [Dr. Gerald Howett and Dr. Judd] found it well worth studying, and believe it should be published." Dr. Judd then said that if I would make some minor changes suggested by Dr. Howett, and change my symbols to conform to optical-science terminology before submitting it to *JOSA*, "I think that the paper would be accepted." *If I* preferred to keep the psychophysical symbols, though, he said, the article would no doubt be accepted in its present form by a just-being-established journal in England called the *International Journal of Optics*.

Wanting to publish the paper in America, where it more likely would be brought to Stevens' attention, I planned to convert the equations to standard optical-physics terminology, but just at that moment a furor arose about my having found, serendipitously (and it got into the newspapers through one of my trainees), that migraine headache could be ameliorated by training the autonomic nervous system to rebalance blood flow in the body, thereby getting excess blood out of the head.

Scornful opposition to this idea by many physicians distracted me, and as a result, being bombarded by arguments about the "involuntary" nervous system, which is only relatively involuntary, as every yogi knows, I didn't take time to convert the psychophysical equations to optical terminology. For the record, though, I included the general psychophysical "law," without its pages of deriva-

tion, in *Beyond Biofeedback.*[14] *[For those who may be interested, we have also included it in the Appendix on page 12. —Eds.]*

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REFERENCES & NOTES

1. Elmer Green, *The Ozawkie Book of the Dead: Or Alzheimer's Isn't What You Think It Is* (Philosophical Research Society, 3910 Los Feliz Blvd., Los Angeles, CA 90027, Oct. 2001) 1-800-548-4062.
2. Gustav Fechner, *Elements Of Psychophysics,* Vol I (H. Adler, translator: D.H. Howes & E. G. Boring, Eds., Holt, Rinehart and Winston, New York, NY, 1966, c1860).
3. S. S. Stevens, To Honor Fechner & Repeal His Law, *Science* **133** (1961), pp. 80-86.
4. Robert G.Jahn & Brenda J. Dunne, *Margins Of Reality: The Role of Consciousness in the Physical World* (Harcourt Brace Jovanovich, New York, NY, 1987).
5. Marsha Adams, Presentation at the Jun97 meeting of the Society for Scientific Exploration, Las Vegas, Nevada, concerning the ability of racoons to operate, through *"desire,"* a mind/machine device which delivered food pellets, 1997.
6. Brenda J. Dunne, Gender Differences in Human/Machine Anomalies, *Journal Of Scientific Exploration* **12** (1998), pp. 3-15.
7. John E. Haaland, Mind and Nonlocality, In (*Bridges* **10,**1 1999, pp. 13-17. [Magazine of the International Society for the Study of Subtle Energies and Energy Medicine, 11005 Ralston Road, Arvada, CO 80004].
8. W. A. Tiller, E. E. Green, P. A. Parks & S. Anderson, Toward Explaining Anomalously Large Body Voltage Surges on Exceptional Subjects: Part I, The Electrostatic Approximation, *Journal Of Scientific Exploration* **9** (1995), p. 331.
9. William A. Tiller, *Science And Human Transformation: Subtle Energies, Intentionality and Consciousness* (Pavior Publishing Company, Walnut Creek, CA, 1997).
10. Elmer Green, Mind Over Matter: Volition and the Cosmic Connection in Yogic Theory, *Subtle Energies* **4,**2 (1993), pp. 151-170. *[Released in 1995]*
11. I. K. Taimni, *The Science of Yoga* (Theosophical Publishing House, Wheaton, IL, 1967.)
12. H. S. Olcott *Old Diary Leaves* (The History of the Theosophical Society) (Theosophical Publishing House, Adyar, India, P. O. Box 270, Wheaton, IL 60187, 1910)
13. Elmer Green, Correspondence between Stevens' Terminal Brightness Function and the Discriminability Law, *Science* **138** (1962), pp. 1274-1275.
14. Elmer Green & Alyce Green, *Beyond Biofeedback* (Delacorte Publishing Co., New York, NY, 1977).

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Appendix

Mathematical Model Of Visual Intensity

Equations 1 through 7 below show the general psychophysical relation between the *physical* intensity of a white light and the *perceived* intensity of the light as a function of adaptation time (t), the length of time in which the human eye is allowed to adjust to the physical brightness. With (t) as a variable, *Equation 1* subsumes both the "logarithmic law" of Gustav Fechner (1860) and the "power law" of S. S. Stevens (1961). Discrepancies between the empirical findings of Fechner and Stevens were caused by differences in research methodology, "operational differences".

Stevens' equation is derived from *Equation 1* by setting (t) equal to zero in *Equation 5*. Fechner's equation is derived from *Equation 1* by setting (t) equal to infinity in *Equation 5*. In actuality, of course, considering the rapidity of adaptation of the human eye to brightness, a few minutes of exposure to the light is sufficient to generate the logarithmic function.

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To develop the following equations would take many pages, so only the conclusions are shown herein. The general equation for visual brightness (ψ) when looking at a white light is:

$$\log \psi = n \, (N_e - 100) + \log \psi_{100} \qquad (1)$$

This equation describes, for example, the sensation of changing brightness after entering a dark theater from broad daylight, and, conversely, after coming out of a dark theater into daylight. In *Equation 1*:

$$\psi_{100} = 100 - 1.253 \times 10^{-3} A^{2.40} \qquad (2)$$

$$n = 0.0333 + 2.566 \times 10^{-11} A^{4.31} \qquad (3)$$

$$N_e = 10 \log (I_f - 10\text{-}3 \, IA^{0.67}) + 100 \qquad (4)$$

In the above four equations:

(ψ) is the general changing subjective sensation of brightness, expressed in brils. A "bril" is the unit of "perceived" brightness.

(ψ_{100}) is the sensation of brightness when the eye is exposed for one second to a white light of 100 decibels intensity (one lambert), after previous adaptation to a white light of (A) decibels (in lamberts). The "lambert" is the unit of physical-stimulus intensity (physical brightness of a light as measured with photo-optical equipment).

(n) is the general slope of the straight portion of the family of power functions (solid lines) shown in *Figure 1.1*.

(N_e) is the effective level of physical-stimulus intensity in decibels (db) when 100 db is equivalent to one lambert.
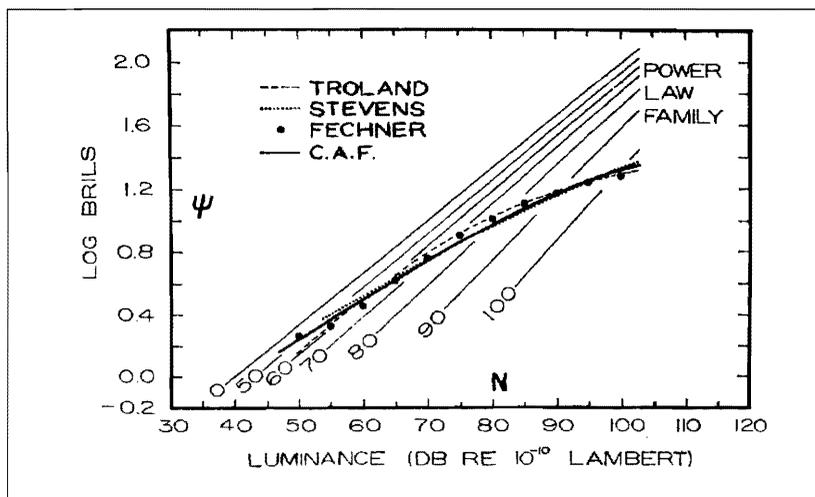

Figure 1.1. "Power Law" and "Discriminability law" data *(Green, 1962). This graph demonstrates the solution to the problem in psychophysics relating* **physical intensity** *of white light N (which is shown as Luminance on the horizontal axis, in decibels relative to 10-10 Lambert) plotted versus* **subjective intensity** *of white light, in "bril" units, ψ, shown on the vertical axis as log ψ). Both the power law (shown by the family of straight lines) and the logarithmic law (shown by curved lines, with CAF being my "continuous adaptation function") are special cases of Equation 1 of the text.*

(A) is the normally-changing adaptation level of the eye, in decibels. By definition, $A = 10 \log I_A + 100$ db, where (I_A) is the changing adaptation level expressed in lamberts.

(I_f) is the experimental value of physical intensity, in lamberts, for a single test trial, during a set of visual-perception tests.

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In lamberts, the adaptation level normally changes in response to a sudden increase or decrease in light intensity according to the following expression:

$$I_A = I_f + (I_1 - I_f)e^{-Kt} \tag{5}$$

This equation, when converted to decibels for use in the expressions for (ψ_{100}) and (n), becomes:

$$A = 10 \log[I_f + (I_1 - I_f)e^{-Kt}] + 100 \tag{6}$$

In the above expressions, (I_1) is the intensity of the light to which the eye is adapted; (K) is the time constant of adaptation (related to the time it takes for 63.2 percent of adaptation to take place); and (t) represents time in seconds after a change in stimulus intensity occurs.

Although it is not needed for obtaining the power law and logarithmic functions, the value of (K) can be approximated from

$$K = 6.37 \ (12.1 + a \ I_f) \ 10^{-4} \tag{7}$$

where (a) is the area of the pupil in square millimeters.

From examining these equations it is clear that the sensation of brightness, ψ of *Equation 1*, can be written in terms of (t), (K), (I_f) and (I_1). In visual research, however, both (I_f) and (I_1) are customarily given various fixed values, as parameters, and the research subject who evaluates brightness for the experimenter looks through a small artificial pupil, so as to make (K) a parameter whose value depends only on I_f. As a result, *time* (t) becomes the only controlling factor in visual perception after a step-change in physical stimulus intensity from (I_1) to (I_f).

To generate mathematically the power functions which were empirically obtained by Stevens, it is merely necessary to let t = 0 in the above equations, so e^{-Kt} = 1.0. This is required because Stevens exposed the eye to changes in brightness for a period of only one second. This is too short a time to allow any significant adaptation to take place in the eye. Thus, in Stevens' research, the sensation of brightness was determined *before* adaptation occurred.

To get Fechner's logarithmic equation, on the other hand, it is merely necessary to insert t = ∞ in the equations, so e^{-Kt} = 0. This is required by the operational fact that Fechner's research was conducted under essentially total adaptation. After half an hour the eye closely approaches its final state of adaptation. Fechner's technique involved the determination of "just noticeable differences" in brightness (jnd's), essentially maintaining a state of continuous adaptation. In other words, in contradistinction to Stevens, he made his measurement *after* adaptation occurred.

The family of power functions in Figure 1.1 is literally generated by assigning a series of values to initial and final stimulus intensities, then calculating (ψ_{100}), (n), and (N_e), and using the derived values in *Equation 1* to obtain (logψ). When t = ∞, then I_A = I_f and A = 10 logI_f + 100 in *Equation 6* and the logarithmic function is generated from *Equation 1* by substituting into it values obtained from *Equations 2, 3,* and *4*.

The three names on *Figure 1.1*, Troland, Stevens, and Fechner, refer to the various curves shown. Stevens' curve (dotted line) was called the "terminal brightness function," but in his articles (1961) he did not recognize it as Fechner's logarithmic law, and in fact he makes the incorrect statement that "A power function, not a log function, describes the operating characteristic of a sensory system." The "terminal brightness function" also corresponds with Troland's *graphical* law for visual function. *C.A.F.* refers to the "continuous adaptation function," the Fechnerian logarithmic function which I derived mathematically from a study of Stevens' power-law data.

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