Book Review: Jensen, A. R. (2006). Clocking the mind: Mental chronometry and individual differences. Amsterdam: Elsevier. (ISBN 978-0-08-044939-5)

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The title of Jensen's new work, *Clocking the Mind: Mental Chronometry and Individual Differences*, conjures up the image of a runner, mentally itching to be released at the starting gates. It is quite fitting in the sense that the purpose of using elementary cognitive tasks (ECTs), the building blocks of chronometric research, is to capture snapshots of the mind in its purest short sprints in an attempt to better understand not only its systematic inner workings but also the implications for the same mind when running a marathon as the incremental aggregation of the brain sprinting smaller distances that add up over time to create an individual's intellectual life.

Opening with an historical account of the origins of reaction time (RT) research in both psychology and astronomy, Jensen demonstrates how individual differences made a difference in the recording of "the time that a given star crossed the hairline in a telescope" (p. 2), sparking the correction of visual recordings of time for individual differences in measurement error. Jensen opens with this simple, relevant story and then pushes forward with another example: how Sir Francis Galton's attempts at measuring RT and correlating it with other variables (e.g., intelligence) failed partly because of the imperfections in the instrumentation and partially because of other factors. Jensen writes,

> Over 95 percent of the literature on reaction time (RT) and individual differences in mental ability has accumulated over just the past two decades. The virtual hiatus in this line of research lasted about 80 years. It is one of the more bizarre and embarrassing episodes in the history of psychology, and one that historians in the field have not adequately explained. Under such conditions [restriction of range of talent, intelligence not measured psychometrically, and reliability of the RT measurements based on only three trials] a nonsignificant result was virtually predestined. Yet for decades this study was credited with having dealt the heaviest blow against the Galtonian position! (p. 155)

What is of interest, of course, is the extent the substance of *Clocking the Mind* adds to the classic *The g Factor* (Jensen, 1998) and specifically the state of the field as Jensen described it in that integrated volume. In *The g Factor*, Jensen notes that even though ECTs seem to have very little of a thinking component to them, when aggregated in a composite they are largely correlated with psychometric tests that have no time requirement. What readers should be happy to know is that *Clocking the Mind* provides a skeletal theory to give bones to the empirical flesh, abundant in the chronometric literature. In contrast to the lack of empirical data backing Howard Gardner's (1993) theory of multiple intelligences, the field of RT has ample data (although much more needs to be collected for the field to move forward), but relatively less theory. Jensen uses his vast knowledge of the literature in chronometry and differential psychology, and psychology more broadly, to construct an elegant theoretical structure.

After the informative and entertaining history, Jensen introduces the chronometric field outlining current basic chronometric terminology and paradigms. He consolidates many terms in the field into one chapter so that researchers entering the field might be able to utilize it as a comprehensive guide to explore new areas in chronometry. Here he introduces the idea that ECTs come in various forms and, just like test items, can vary greatly in many ways and have an almost infinite array of combinations.

In chapter 3, Jensen discusses RT as a function of experimental conditions. To borrow a quote from a later section on the chronometry of cognitive aging, he writes,

> Experimental psychologists have typically eschewed invoking latent variables in their explanations of behavior. Particularly troubling for the experimenter is the fact of large individual differences in performance under identical conditions of the experimental task. Behavioral variables that cannot be directly manipulated by the experimenter traditionally have been of little interest in their own right. The experimental psychology of aging, however, has now virtually forced us to pay attention to latent variables. (p. 97)

Thus, chronometry is presented as the interface of experimental and differential psychology, a successful negotiator between these two groups of thought.

Note: This article accepted under the editorship of Paula Olszewski-Kubilius.

It is in chapter 4 that Jensen delves into the measurement of chronometric variables:

> The greatest problem in psychometrics is the measurement properties of test scores, even when all of the most sophisticated methods of test construction have been rigorously applied. The bothersome problem is the uncertain nature of the relationship between the metric of the obtained test scores (however standardized or transformed, e.g., IQ) and the metric of the *latent trait* the test is assumed to measure. (p. 56)

Indeed, we come to appreciate what it would mean if chronometric G is measurable on a ratio scale, one of the fundamental features that is lacking in the measurement of intelligence using standard psychometric measures. Jensen provides many lines of evidence for and convincingly argues this case in chapter 11. Quoting Peak and Boring (1926), "if the relation of intelligence (as the tests have tested it) to reaction time of any sort can finally be established, great consequences, both practical and scientific, would follow" (p. 94).

It is in the fifth chapter, covering the chronometry of mental development, that we sample the first taste of why chronometry will have important implications. The two primary advantages (which do not currently exist in any other psychometric measures) are (a) that the independent and dependent variables (here age and behavior) are directly measured as time on the same ratio scale and (b) that many chronometric measures give researchers very reliable measurements from the very young to the very old and from the mentally challenged to the mentally gifted. These two advantages open up many broad avenues of important research. If IQ could be measured on a ratio scale, there would be important implications for multiple psychological arenas.

Jensen introduces us to the chronometry of cognitive aging in chapter 6, where "the overall picture of mental decline, beginning in the mid-twenties,[1] as shown by chronometric tests, is much like a mirror image of the developmental curves from early childhood to maturity" (p. 97). This image of the rise and decline of the mind as measured by time is enlightening. In this chapter, Jensen discusses the importance of investigating brain–behavior connections and how on the behavior side of things the use of mental chronometry is indeed an exceptional advance. "The brain itself is inherently a kind of time machine or biological clock" (p. 97).

It is in chapter 7 that Jensen cites several studies in the literature to demonstrate that the G of speed of information processing and psychometric *g* are highly related and are so largely because of correlated genetic effects, arguing that this provides evidence that G and *g* may indeed be one and the same. It is interesting that Jensen closes with an example of how one might acquire knowledge and skills over time to create lifetime intellectual achievements:

> In acquiring knowledge and skills over an extended period of time, individual differences in speed of information processing are much like differences in compound interest rates acting on a given amount of capital. The seemingly slight but consistent individual differences in such relatively elemental processes as are measured by ECTs, when acting over periods of months or years, therefore, can result in remarkably large individual differences in achievement. (p. 134)

Here we are introduced to an explanation that is similar to Robert Gordon's (1997) idea that life is a test and that each day we face new test items. Those who are successful, or score highest on this test, are the individuals who pass items in aggregation over large stretches of time. In the short run, it may not seem like much, but in the long run these small differences in processing speed can definitely add up. RT is noted by Jensen to be closely tied to the workings of the brain and biology. The presentation of the heritability of chronometry is unsurprising yet has fascinating (and also possibly controversial) implications.

In chapter 8, Jensen presents more evidence for the overlap between G and *g*, only now from a factor analytic perspective. However, Jensen goes on to argue that so much research has focused on the relation of RT and psychometric intelligence that the "factor structure of RT tasks has never been systematically studied in its own right" (p. 137). And Jensen thus emphasizes that the chronometry of ECTs deserves an area of study while standing alone, as the factor structure of ECTs may be similar to yet different from that of psychometric tests.

Chapter 9 relates Jensen's attempts in the late 1970s to conduct research on the correlation between RT and IQ. The majority of psychologists he encountered looked down on or attempted to dismiss the idea. However, he pressed forward. He outlines hypotheses as to why there was such an apparent prejudice against the idea that ECTs could be related to IQ. It seems that Jensen encountered some obstacles because of the idea entrenched in the minds of many (including accomplished psychologists) that nothing as simple as ECTs could bear relation to the complex workings of the richest mind at work. Jensen also introduces a fundamental

conclusion: "So *g,* whether psychometric or chronometric, is pretty much one and the same general factor" (p. 175). Throughout each of the chapters of the book, including this one, he slowly gives incremental evidence that builds up so that when all the pieces are brought together to make a crucial case for his theory, he is convincing indeed.

Moving on to chapter 10, Jensen further discusses how even though RT tasks may seem simpler than psychometric test items, we can even go deeper, looking at more fine-grained analyses of these tasks, breaking them down into psychological particles the way physicists do. In this case, however, Jensen outlines the components as sensory, motor, and cognitive. Here he introduces the concept of inspection time (IT) and its importance in research because of its absence of a motor component and IT's high relation to *g*. And he then goes on to discuss current results in the field and emphasizes that much of this research needs to be replicated, a point that he especially stresses in his final and concluding chapter.

And here is where we arrive, not necessarily at the final destination, but at the theory, in chapter 11:

> We can no longer regard seriously the earlier criticisms of attempts to explain the basis for this remarkable correlation by questioning its existence or validity. The RT–IQ correlation *per se* is an empirical fact as thoroughly proved as any phenomenon in the behavioral sciences. (p. 199)

Jensen goes on to mention the critical variables that need to be considered when constructing a theory of the RT–IQ correlation. He explains how this is a key step in the move toward an understanding of the physiological basis of *g*, which he strongly argues is highly overlapping with G.

In chapter 12, the relationship between chronometric measures and other variables, such as short-term memory span, long-term memory, mental retardation, and giftedness and special talents, is included. Here Jensen discusses the use of chronometry to assess very high levels of giftedness:

> What has not yet been determined is whether the highest levels of the *g* dimension that can be convincingly assessed by standardized psychometric scales are measurable by speed of information processing on relatively simple chronometric tasks. Within the range of standardized psychometric IQ up to about 160, there seems to be no departure from a linear relationship between IQ and [these tasks]. More extraordinary levels of a specific kind of cognitive performance probably represent some quite specialized and highly focused investment of *g* in a very narrow sphere of cognition. (p. 227)

First, the correlation between IQ and chronometric tasks implies that one could use these tasks as measures of IQ. Many culture-based arguments that dismiss IQ tests as favoring one group or another would be completely irrelevant if the test included such a "nonverbal" task as an ECT. *Culture fair* would indeed become a plausible term that would hold meaning. Second, the conjecture that above an IQ of 160 there might be other forces at work is connected to Jensen's personal hobby of studying the work of musical geniuses and their own unique signature. Jensen then asks what the essential features of performance are that distinguish the giants from the merely quite excellent. The answer: distortions by the master performer in the musical score, which he describes as "aesthetic excitement." He talks about a great conductor's (Furtwängler) rendition of a piece by Beethoven (Ninth Symphony) and how this was a result of Furtwängler's "superb, almost magical, fine-grained control of the orchestral forces" (p. 230). Hence, we see the implications that chronometry has for expertise.

Chapter 13 provides an introduction to the potential impact on medical research and its application. However, the area that potentially will benefit greatly is pharmacology because of the sensitivity that chronometric tasks have. Therefore, this book will be of great interest to those working in the medical discipline, demonstrating how far reaching the field of chronometry is. For example, he details how different medical conditions, including diabetes, psychiatric disorders, and chronic fatigue syndrome, show statistically significant effects on RT (when comparing the experimental to control group). However, Jensen notes an important problem: the inability for anyone to make a systematic review of this literature (he had reviewed more than 100 articles apparently) because of the heterogeneity of the methods used. And so he moves us to consider a final important chapter (14) that emphasizes the need for the standardization of various tasks so that labs that use different apparatus will be able to have comparable results. Currently, the only aspect of chronometry that is standardized is that the error is within a few milliseconds. Beyond that, method variance problems (e.g., different angled consoles or variations in the push buttons) are a large and problematic issue for the field. Therefore, not only will standardization be important for psychologists who wish to compare and contrast the various studies, but it is also necessary especially for those in medical research.

Jensen quotes Salthouse (1996) on the importance of mental chronometry:

> Because time is an objective and absolute dimension rather than a norm-reference scale, as is the case with most behavioral measures, it is inherently meaningful in all disciplines and this has the potential to function as a Rosetta stone in linking concepts from different disciplines. (p. 425)

In *Clocking the Mind*, it is evident that the author is indeed the Rosetta stone of the field of mental chronometry, bringing together many different disciplines, linking great minds together so that this might spur forward great work. What is clear in the writing style, the clarity of logic, and the extraordinary thoughtfulness of this book is that Arthur R. Jensen has created a masterpiece.

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Note

1. Changed incorrectly by the editor to *mid-1920s* on p. 97.

References

Gardner, H. (1993). *Frames of mind: The theory of multiple intelligences.* New York: Basic Books.

Gordon, R. A. (1997). Everyday life as an intelligence test: Effects of intelligence and intelligence context. *Intelligence*, *24*, 203-320.

Jensen, A. R. (1998). *The g factor: The science of mental ability*. Westport, CT: Greenwood.

Peak, H., & Boring, E. G. (1926). The factor of speed in intelligence. *Journal of Experimental Psychology*, *9*, 71-94.

Salthouse, T. A. (1996). The processing-speed theory of adult age differences in cognition. *Psychological Review*, *103*, 403-428.

Piechowski, M. (2006). *"Mellow out," they say. If I only could. Intensities and sensitivities of the young and bright*. Madison, WI: Yunasa. (ISBN 0-9777530-0-X)
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Piechowski begins and ends his book with the assertion that he wants to give voice to gifted adolescents and their experiences of emotional and spiritual growth. Quoting liberally from interviews, surveys, and interactions with gifted children and adolescents over the course of three separate studies and 40 years, Piechowski conveys the unique quality of inner development experienced by gifted individuals. The overall effect is one of a revered expert in the field of gifted education sharing his cherished work.

Piechowski leaves the spotlight on the adolescents and says very little to influence the meaning of their words. Yet by weaving in autobiographical data, Piechowski also shares his own story and the work he accomplished with the renowned Polish psychologist and psychiatrist, Kazimierz Dabrowski, author of the theory of positive disintegration, a theory of personality development. Consciously or unconsciously, Piechowski draws us into his story and the story of his participants and students.

In the beginning of the book, we learn of Piechowski's own well-developed sense of self and his decision to turn away from life as a professor of molecular biology.

> I began to be haunted by the image that I was walking down a hallway. At the end was a wall with glass blocks to let in the light but there was no exit. This recurring image was showing me a block in my life's trajectory. I knew then that I . . . had to change fields. (p. 15)

Thus began his lifelong study of the emotional life of gifted children and adolescents. By the end of the book, we, too, are walking with Piechowski down a hall that enlightens. The crowning section of the book introduces us to a central theme in the lives of many gifted children and adults, that of spiritual knowledge and development. In between, Piechowski devotes sections to explaining the role of energy in the development of the intellect, how imagination fuels the intellect, and the role of the emotional life in the growth of an individual.

Piechowski remains true to his intent to provide an opportunity for readers to listen to the voices of gifted young people as they discuss the vagaries of the inner struggle to know themselves and their relationship to others and the world. Rather than creating another model of emotional development, he interweaves Dabrowski, Kawczak, and Piechowski's (1970) work on personality development, as well as Lovecky's (1990, 1992) on entelechy, "a vital force guiding one's life" (p. 224), and William James's (1990) classic early-20th-century thought on religious experience.

In the first section, "A Matter of Heart," Piechowski justifies his decision to study the emotional lives of individual gifted children and adolescents by pointing out the lack of such study among the great founders of the field of psychology. Freud's conceptions of how the mind works and Carl Rogers's theory of emotional nurturance and positive regard, and the work of other well-known theorists, do not provide the material he