



**UNIVERSITY OF  
ILLINOIS PRESS**

---

Review: Understanding the Allure and Pitfalls of Chomsky's Science

Reviewed Work(s): *Decoding Chomsky: Science and Revolutionary Politics* by Chris Knight

Review by: Gary Lupyan

Source: *The American Journal of Psychology*, Vol. 131, No. 1 (Spring 2018), pp. 112-119

Published by: University of Illinois Press

Stable URL: <http://www.jstor.org/stable/10.5406/amerjpsyc.131.1.0112>

Accessed: 01-07-2018 21:50 UTC

## REFERENCES

Linked references are available on JSTOR for this article:

[http://www.jstor.org/stable/10.5406/amerjpsyc.131.1.0112?seq=1&cid=pdf-reference#references\\_tab\\_contents](http://www.jstor.org/stable/10.5406/amerjpsyc.131.1.0112?seq=1&cid=pdf-reference#references_tab_contents)

You may need to log in to JSTOR to access the linked references.

---

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact [support@jstor.org](mailto:support@jstor.org).

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at <http://about.jstor.org/terms>



JSTOR

*University of Illinois Press* is collaborating with JSTOR to digitize, preserve and extend access to *The American Journal of Psychology*

unfocused crying). Complementary endowments in the caregiver include coarse-grained interpreter skills, exaggerated affect mirroring, and “motherese” (collectively called intuitive parenting skills). I argue that the synchronized and mutual modulation of the relevant causal processes in caregiver and neonate provide the necessary and sufficient conditions for the development of full, uniquely human capacities from these coarse-grained precursors but only within a close, linguistically mediated social relationship. Uniquely human emotionality, language, and symbolic thought are progressively refined and elaborated concurrently and through the same developmental mechanisms. I describe in detail how a barely sentient and utterly dependent human neonate develops into an entirely autonomous agent, fully sapient, who emotes, thinks, and communicates in ways typical of or unique to her species and culture. An implication of my analyses is that uniquely human emotionality and thought, including moral thought, are language dependent.

The close, linguistically mediated relationship of neonate and caregiver provides the fuel for the simple and otherwise numbingly repetitious interaction on which human development critically depends. The repetitious interactions of cleansing, changing, feeding, playing, and so on, which continue day in, day out in infancy and childhood, provide massive, sociocultural epigenetic scaffolding through auditory, visual, tactile, and olfactory stimulation. This triggers the release of endogenous opioids and prosocial neurochemicals, especially oxytocin. These neurochemicals, in turn, trigger the release of intraneural genetic products into neurogenesis and connection and maturation of neural circuits as well as feelings of trust and intimacy. This process ensures that energy-expensive neural circuits are constructed only as needed to support progressively sophisticated emotional, linguistic, and cognitive capacity. It continues throughout the life of the organism but is especially powerful in the very early years. The theory I develop, therefore, explains in detail the emergence of the proximate psychological capacities prerequisite to the evolution of human cognition and morality, in terms both of neurogenesis and sociocultural stimulation, which Tomasello briefly describes but fails to explain.

Considering the importance of the contribution of *A Natural History of Human Morality* to developmental and comparative psychology and evolutionary anthropology, these concerns are relatively small fry. Overall, the book is a delightful read, and I hope I

have made this clear. I recommend it to every member of our species who is interested in how human morality evolved.

Jennifer Greenwood  
*School of Historical and Philosophical Inquiry*  
*University of Queensland*  
*St. Lucia, Brisbane*  
*Queensland 4072, Australia*  
 E-mail: j.greenwood2@uq.edu.au

#### REFERENCES

- Birch, J. (2017). Book review: Michael Tomasello: A natural history of human morality. *British Journal for the Philosophy of Science: Review of Books*.
- Churchland, P. (2011). *Braintrust: What neuroscience tells us about morality*. Princeton, NJ: Princeton University Press.
- Greenwood, J. (2015). *Becoming human: The ontogenesis, metaphysics and expression of human emotionality*. Cambridge, MA: MIT Press.
- Stanford, P. K. (2017). Bending towards justice. *Philosophy of Science*, 84, 369–376.
- Tomasello, M. (1999). *The cultural origins of human cognition*. Cambridge, MA: Harvard University Press.
- Tomasello, M. (2009). *Why we cooperate*. Cambridge, MA: Harvard University Press.
- Tomasello, M. (2014). *A natural history of human thinking*. Cambridge, MA: Harvard University Press.

## UNDERSTANDING THE ALLURE AND PITFALLS OF CHOMSKY'S SCIENCE

### Decoding Chomsky: Science and Revolutionary Politics

By Chris Knight. New Haven, CT: Yale University Press, 2016. 304 pp. Hardcover, \$30.

***Abstraction, functioning in this way, becomes a means of arrest far more than a means of advance in thought. It mutilates things; it creates difficulties and finds impossibilities. . . . The viciously privative employment of abstract characters and class names is, I am persuaded, one of the great original sins of the rationalistic mind.***

—William James (1909)

When I was in graduate school, I chanced on a book by Howard Kunstler, *The Geography of Nowhere: The Rise and Decline of America's Man-Made Landscape* (1994). The book is a history and critique of suburbanization of the United States—in Kunstler's words, “the ghastly spectacle of construction and

destruction that converted a lovely, verdant, beckoning New World continent into a wilderness of free parking.” What I found most appealing about it was that it helped bring into greater focus my vague dissatisfaction with the suburban landscape. It not only helped answer questions about how the landscape came to be that way but put its finger on precisely what it is about the landscape that leads to this dissatisfaction. Chris Knight’s *Decoding Chomsky* does much the same for helping us understand how Noam Chomsky became the most highly cited person alive today, analyzing the historical and intellectual landscape that led to Chomsky being compared to Galileo, Newton, and Einstein, voted as the world’s top public intellectual in 2005, and even crowned royalty: Before a 2014 address at the Vatican, Chomsky was introduced as “one of the princes of linguistics.” Knight counterposes this acclaim with the strangeness of the ideas Chomsky has championed since the 1950s and makes a compelling case for the scientific vacuousness of these ideas.

It is routine for Chomsky to be hailed as the person who solved how language works. For example, writing for the *New Yorker*, Anthony Gottlieb (2012) singles out David Marr’s work on vision and Noam Chomsky’s work on language as “the most solid . . . accounts of mental mechanisms.” Culture critic David Golumbia writes that not only did Chomsky redefine the entire discipline of linguistics, “but his work has been something close to definitive in psychology, philosophy, cognitive science, and even computer science” (Golumbia, 2009, cited by Knight on p. 2).

And so it comes as a shock to the uninitiated that the version of language Chomsky is supposed to have solved bears no relationship to language as understood not only by laypeople but by most practicing language researchers. Beginning with the opening chapters of the book and throughout the later ones, Knight lays out the full strangeness of Chomsky’s vision. Is language primarily for communication? Did language evolve? Do children need to be spoken to (or signed to) in order to become competent language users? Is language a social product? If you answered “yes” to any of these questions, you fundamentally disagree with Chomsky on the definition of language.

Language in Chomsky’s view is reduced to an innate biological (though not gradually evolved) universal grammar (UG). Contra a common misunderstanding, UG is not the set of features that all languages have in common (a search for such linguistic similarities was the goal of Joseph Greenberg’s school of linguistics, which Chomsky rejected). Rather, UG

is a set of computational properties that make it possible for people to learn (all) natural languages and to produce infinitely many utterances with a finite brain and a finite amount of experience. Stipulations about what is part of UG have changed radically during Chomsky’s career, but as Knight makes clear, the commitment to UG as the correct way to study language has remained (it is plainly stated in recent reviews of the generative approach, e.g., Everaert, Huybregts, Chomsky, Berwick, & Bolhuis, 2015). The focus on grammatical competence as the subject of study meant denying the reality of what the rest of language researchers call “language.” Drawing on Chomsky’s writings and quoting him heavily, Knight describes how according to Chomsky “the technical term ‘language’ has no relation at all to the pre-theoretical term ‘language.’” Chomsky asserts that although UG is “something real, it is in your head, it is in my head, it is physically represented in some fashion,” “what is now ‘language’ does not need any term at all, because it is a totally useless concept. . . . It does not fit with linguistic theory, it has no existence” (p. 201).

Readers would be justified in thinking that this sounds like doing science by decree. Is Knight exaggerating? It would be a mistake to generalize the critiques of Chomsky to the field of generative linguistics at large, which contains many linguists who have distanced themselves from Chomsky (particularly in the wake of the Minimalist program), but it is Chomsky rather than generative linguistics at large that is at the center of *Decoding Chomsky*, and the characterization of Chomsky’s *modus operandi* seems valid. Consider, for example, the program of the University of Edinburgh’s Language Evolution and Computation Unit (e.g., Kirby, Cornish, & Smith, 2008; Kirby, Dowman, & Griffiths, 2007; Kirby, Griffiths, & Smith, 2014; Thompson, Kirby, & Smith, 2016). This work turned the “stimulus is poor therefore children must rely on an innate language acquisition device” dogma on its head by showing that it is *because* children have limited memory and are exposed to only a subset of utterances they will need to produce that language evolved—through cultural evolution—design features such as compositionality that allow it to be learned from limited input. Berwick and Chomsky dismiss all this work with a casual but telling remark: “In brief, [this work] does not appear to deal with the nature of the language faculty as we construe it here, and hence has nothing to say about the evolution of language” (Berwick & Chomsky, 2016). By the “language faculty as we construe

it here,” Berwick and Chomsky are referring to UG. The idea that UG “can serve as the object (and the sole object) of a truly scientific study of language” is, according to Knight, “the foundational error at the root of all Chomsky’s other intellectual contradictions and difficulties” (p. 237).

#### *How Did It Begin? The Original Allure of Chomsky’s Vision*

The work that propelled Chomsky to stardom was the 1957 publication of *Syntactic Structures*. Quoting a variety of sources, Knight writes that it was “the snowball which began the avalanche of the modern ‘cognitive revolution.’ . . . ‘In the beginning was *Syntactic Structures*’” (p. 14). Knight points out that both *Syntactic Structures* and the similarly influential *Aspects of the Theory of Syntax* were funded in part by grants from the military. Knight asks two questions: First, why did Chomsky (“an outspoken anarchist and anti-militarist”) take the money? A more interesting and pertinent question is, “What did the military think they were buying?” (p. 16). Quoting some of the original Air Force backers of the work, Knight argues that the military “sponsored linguistic research in order to learn how to build command and control systems that could understand English queries directly” (p. 17). It is not that the military thought Chomsky would deliver them a product that would enable some kind of thought-to-machine-code translator. Rather, Chomsky’s vision was attractive because it promised to “reduce the amount of knowledge needed to understand the field” (p. 18). Rather than having to bother with details of specific languages and cultures, language could be reduced to pure, culture-free computation. If a division is established between competence and performance, all “imperfections” of language (that is, aspects that were not well fit to the theory) can be ascribed to performance, with *competence* remaining an object of a purely naturalistic science.

Several chapters of the book are devoted to describing the intellectual climate that made this vision of language so appealing. In one of my favorite passages of the book, Knight quotes mathematician Warren Weaver, envisioning—in 1955—a kind of Babylonian antitower. Weaver imagines people living in a series of tall closed towers, and communication between the towers can be achieved only with great difficulty. “But, when an individual goes down his tower, he finds himself in a great open basement, common to all the towers. Here he establishes easy and useful communication with the persons who have also descended from their towers. . . . The way

to translate from Chinese to Arabic, or from Russian to Portuguese, is not to attempt the direct route, shouting from tower to tower. Perhaps the way is to descend, from each language, down to the common base of human communication—the real but as yet undiscovered universal language” (p. 55). Chomsky never strove for the development of a universal language and did not share Weaver’s enthusiasm for the possibility of machine translation. But enough people in the 1950s had this dream to make Chomsky’s research program seem like the perfect fit for turning it into reality.

#### *Where Are the Data?*

Readers of *Decoding Chomsky* (and of this review) may naturally ask: Surely, Chomsky and his collaborators have offered empirical support for their theory! After all, it is, as Chomsky frequently reiterates, the only truly scientific approach to the study of language. Science requires data. What data have been offered in support of Chomsky’s theories? This is one area in which I wish *Decoding Chomsky* offered additional details because it would help strengthen Knight’s argument that Chomsky’s ideas lack empirical support. Recent articles address some of these shortcomings in greater detail (Edelman, in press; LaPolla, 2015; Lin, 2017; see Ibbotson & Tomasello, 2016, for a discussion aimed at a more general audience).

As someone studying language outside the generativist tradition, what has always struck me about the generativist approach to data is that the only data offered seem to be in the form of “Sentence X is grammatical and sentence Y is not,” and it is the job of alternative approaches to show how they could address the theoretical constructs of the generativist approach. Here is an example from a recent review article whose central argument is that approaches to language that focus on statistical analysis and treat language as ordered strings can never succeed. Why not? Because, argue the authors, it is only by analyzing language using the generativist approach that one can understand phenomena such as “parasitic gaps” (Everaert et al., 2015). A parasitic gap (PG) is defined in the article’s glossary as “a gap (a null variable) that depends on the existence of another gap RG [real gap], sharing with it the same operator that locally binds both variables. PG must conform to a binding condition asserting that PG cannot be c-commanded by RG” (p. 732). It is this phenomenon that is supposed to explain why the sentence “Guess which politician your interest in Jane clearly appeals

to” is grammatical while the sentence “Guess which politician your interest in clearly appeals to Jane” is not. (If the grammatical sentence strikes you as no more understandable than the ungrammatical one, worry not, you are simply the victim of processing constraints.)

There are two key problems with such data. First, the methods used to collect and analyze grammaticality judgments are characterized by a “deplorable . . . lack of rigor” (Schütze, 2016; see also Grandy, 1980). Typically, there is no systematic collection of grammaticality judgments and no statistical analysis. In other words, there is no attempt to do serious data collection in the one area that is supposed to provide empirical support for the theories. In an attempt to find out why this is the case, Schütze reached out to Chomsky, and Chomsky replied that research practices in linguistics ought to follow the natural sciences, where “almost no one devotes attention to ‘methodology’” (Schütze, 2016). I have a hunch that natural scientists would disagree.

The second problem (which helps to explain the first) is that even if we take grammaticality judgments as the behavior to be explained (which is rather strange in itself), it is *behavior* that is the target of explanation, not theoretical constructs such as parasitic gaps. Suppose that an alternative to explaining the pattern of grammaticality judgments is offered based on this or that domain-general psychological principle or an analysis of language statistics or differences in learnability of one kind of construction or another. The response by Chomskyan linguists to such demonstrations tends to be, “But this does not explain parasitic gaps.” This is precisely the argument of Everaert et al.: “Applying analytical or statistical tools to huge corpora of data in an effort to elucidate the intriguing properties of parasitic gaps will not work” (Everaert et al., 2015, p. 735). Why should the goal be to account for the *theoretical construct* that is a parasitic gap? In the absence of independent evidence that a parasitic gap is something real, theories of language are not obliged to explain it.

This point concerns far more than esoteric constructs such as parasitic gaps. What is the independent evidence for the reality of “empty categories,” “movement,” or “C-command”? If it becomes possible for a machine to parse natural language without the use of these constructs, as is increasingly the case, does it not show the superfluosity of these constructs (see Norvig, 2011, for a discussion relevant to this point)? Knight cites linguist Frederick Newmeyer as saying that the proof of Chomsky’s

success lies not in any evidence that his theories actually worked but “because anyone who hopes to win general acceptance for a new theory of language is obligated to show how the theory is better than Chomsky’s” (p. 180). It is an unhealthy state of affairs if the test of alternate theories is to see how well they explain Chomsky’s constructs rather than how they address empirical phenomena.

Once upon a time, people thought that burning substances released phlogiston. Phlogiston was used to explain why some substances became lighter when burned and what made some metals rust. In time, our understanding of oxidation reactions made phlogiston unnecessary. Rejection by generative linguists of nongenerative theories because the latter fail to explain constructs such as parasitic gaps is akin to rejecting modern chemistry because it has failed to isolate phlogiston.

#### *Politics and Science*

Although *Decoding Chomsky* is focused primarily on Chomsky’s science, Chomsky’s role as a public intellectual is linked to his political activism. When asked, Chomsky denies there is any connection between the scientific and political persona, remarking sometimes that the linguistics takes away time from what really matters (Horgan, 2016). The distinction between Chomsky the scientist and Chomsky the activist is a stark one. Chomsky the scientist believes that *Language* (scientifically understood) is devoid of communicative intent, social meaning and “anything else which the rest of us would associate with language” (p. 136): “While the scientist says language is not for communication at all, the ordinary human Chomsky uses language precisely to communicate—to denounce his own state, his own government, his own employers, his own institutional milieu . . . opposing just about everything which he embodies in his alternative role” (p. 136). “In order to understand the peculiarities of the science,” writes Knight, “we must understand the political commitments against which it has always been counterposed” (p. 130).

Knight believes that Chomsky’s politics and activism are indeed kept separate by what he calls a “fire-wall” erected by Chomsky and “designed to separate ‘science’ from any kind of social or political activism” (p. 193). In perhaps the most provocatively titled chapter in the book, “Mindless Activism, Tongue-Tied Science,” Knight presents a compelling argument that Chomsky’s activism, barred from drawing on the scientific method, becomes, by design, mindless and scientifically illiterate (which according to

Knight would “prove a disaster for the global revolutionary left,” p. 200). At the same time, in an effort to be “naturalistic,” the science expunges all aspects of culture and socialization as outside its purview and is consequently *tongue-tied*, having nothing to say about politics. In this model, “you are either a scientist or an activist; you cannot play both roles at the same time. . . . A climate scientist, for example, will be respected for reporting worrying findings, but condemned for resorting to direct action to avert the consequences. Those who do confuse roles in this way risk being accused of betraying their vocation” (p. 197). That this may appear entirely normal to current scientists is precisely Knight’s point. He suggests that the current separation between science and activism is far from how it was envisaged before Chomsky and is indeed one of Chomsky’s legacies.

Politics aside, there is a second sense in which Chomsky’s science is tongue-tied. By defining language as an idealized grammatical competence that cannot be studied using normal scientific methods, the science becomes dedicated to solving problems of its own making, having nothing to say about the kinds of scientific questions everyone else cares about. As Robin Tolmach Lakoff argues in *The Language War*, accepting the generative approach to studying language means “accepting the impossibility of saying almost everything that might be interesting, anything normal people might want or need to know about language” (2000, p. 7).

#### *The Road Ahead: Chomskyan Linguistics Versus Modern Language Research*

Reading *Decoding Chomsky* may give the impression that the state of modern language research is decidedly poor, that linguistics and the language sciences are dominated by a powerful figure whose intuitions “as to what a theory ought to look like, [led] an army of people go out and reanalyze everything to conform to that intuition” (from Kenneally, 2008, cited by Knight on p. 179). (Of course, given that the data are largely introspective judgments about grammaticality, reanalysis can simply involve adjusting one’s grammatical intuitions.)

I am saddened by the brilliant minds who have dedicated themselves to trying to resolve the specific problems posed by Chomskyan linguistics (of the “why X is grammatical and \*X is not” variety) given that so many of these problems appear to be the field’s own making. Chomskyan generative linguistics seems to be an abject study of what William James called “vicious abstractionism”; it is what hap-

pens when we single out “some salient or important feature [of a phenomenon] and instead of adding to its previous characters all the positive consequences which the new way of conceiving may bring, we proceed to use our concept privatively . . . treating it as a case of ‘nothing but’ that concept, and acting as if all the other characters from out of which the concept is abstracted were expunged,” a kind of reasoning that, according to William James, is one of the “great original sins of the rationalist mind” (James, 1909). Perhaps I am simply missing the key insight that is supposed to allow me to understand the empirical phenomena Chomsky’s vision of language is supposed to have solved, but it is difficult to see a future for a scientific study of language as a grammatical competence that did not evolve and does not lend itself to empirical investigation aside from casual reliance on grammatical intuitions of linguists (Schütze, 2016; see also Massaro, 2017).

In contrast, the state of modern language research—at least from where I stand—looks very different. There is a vast chasm between the self-referential program of Chomskyan linguistics and modern research on just about every aspect of language that is happening outside the Chomskyan fold. Research in linguistic typology is being standardized and unified (e.g., <http://wals.info>; <http://glottobank.org>), the ability to look at the full diversity of human languages is enabling us to draw richer inferences about the human language capacity (Dunn, Greenhill, Levinson, & Gray, 2011; Lupyan & Dale, 2016), and the study of language history is being made more rigorous by the application of quantitative phylogenetics (Gray & Atkinson, 2003; Gray, Drummond, & Greenhill, 2009). Combining psycholinguistic data with computational models is helping to show how more abstract grammatical knowledge emerges from experience with specific utterances (Chang, Dell, & Bock, 2006). Theories of language comprehension and production are being integrated with theories of memory and motor control (MacDonald, 2013), and we are better understanding how people may learn the meanings of words from statistical patterns in word usage (e.g., Bruni, Tran, & Baroni, 2014; Mikolov, Chen, Corrado, & Dean, 2013). There is a growing excitement about comparative and computational approaches to studying cultural evolution and for understanding the relationships between the evolution of cooperation and language (e.g., Henrich, 2015; Kirby et al., 2014; Oller & Griebel, 2004; Smith, 2010; Tomasello, 2008).

Predictably, Chomsky believes none of this work has any relevance for understanding *Merge* (the latest of many formulations of UG) and therefore the work is irrelevant for language (Berwick & Chomsky, 2015; Everaert et al., 2015), an opinion most practicing language researchers fortunately ignore.

Applying the scientific method to questions decreed by Chomsky as irrelevant and unscientific is paying dividends. For example, Chomsky's repeated assertion that the input children receive does not matter because language is not something children learn, but that it is something that happens to them "like puberty" (e.g., Chomsky, 1987), led researchers to ignore, for many decades, the relationship between language input and language outcomes (see Bates et al., 1994, for an important exception). But of course in reality children's language comprehension and production are enormously affected by input (Hart & Risley, 1995; Fernald, Marchman, & Weisleder, 2013; Hoff, 2003), an issue of significant public importance. (Anyone insisting that it is linguistic *competence* that is independent of language input needs to explain why competence in the absence of performance matters and actually provide evidence for preserved competence in the face of truly compromised input.)

### Conclusion

When questioned about the progress of generative linguistics, Chomsky has often remarked that linguistics and cognitive science are in a pre-Galilean state, with thinkers beginning to formulate the questions in the right way, and that "someday someone is going to come along and say 'Look, you guys, you're on the right track, but you went wrong here. It should have been done this way.' Well, that will be it. Suddenly things will fall into place" (p. 178). This quote is taken from an interview conducted in 1983 (Chomsky, 2003). A nearly identical statement appears in an interview with *The Atlantic* in 2012 (Katz, 2012) and in a lecture at Princeton summing up 60 years of generative linguistics (Chomsky, 2014). In Knight's words, "With each new disappointment, [Chomsky] turns with undimmed optimism toward the future—to a moment of revelation, when, quite suddenly things will fall into place" (p. 174). In an especially vivid assessment of Chomsky's many versions of UG, Knight is "reminded of a man on the doorstep fumbling with his key in the half light. He . . . turns it this way and that. Despite all his fumbblings, the lock just will not yield. To those watching, the most likely explanation is that he's got the wrong key" (p. 178).

The future of linguistics and cognitive science may indeed look very different from its present. Our intellectual descendants may see the present period as primitive, pre-Galilean even. But what are the chances that future scientists will confirm that the key to understanding language lies in stripping it from all that makes it language? And that although such an approach should be, as Chomsky often remarks, "obvious to any thinking person" (Chomsky, 2014), it nevertheless failed to produce any empirical evidence that makes sense outside an ever-shifting theoretical framework of its own making? I wouldn't bet on it.

Gary Lupyan  
*University of Wisconsin*  
 1202 W. Johnson St.  
 Madison, WI 53706  
 E-mail: lupyan@wisc.edu

### REFERENCES

- Bates, E., Marchman, V., Thal, D., Fenson, L., Dale, P., Reznick, J. S., . . . Hartung, J. (1994). Developmental and stylistic variation in the composition of early vocabulary. *Journal of Child Language*, 21, 85–123.
- Berwick, R. C., & Chomsky, N. (2015). *Why only us: Language and evolution*. Cambridge, MA: The MIT Press.
- Berwick, R. C., & Chomsky, N. (2016). Why only us: Recent questions and answers. *Journal of Neurolinguistics*. Retrieved from <https://doi.org/10.1016/j.jneuroling.2016.12.002>
- Bruni, E., Tran, N. K., & Baroni, M. (2014). Multimodal distributional semantics. *Journal of Artificial Intelligence Research*, 49, 1–47.
- Chang, F., Dell, G. S., & Bock, K. (2006). Becoming syntactic. *Psychological Review*, 113, 234–272. Retrieved from <https://doi.org/10.1037/0033-295X.113.2.234>
- Chomsky, N. (1957). *Syntactic structures*. The Hague, The Netherlands: Mouton.
- Chomsky, N. (1965). *Aspects of the theory of syntax*. Cambridge, MA: MIT Press.
- Chomsky, N. (1987). *Language and problems of knowledge: The Managua lectures*. Cambridge, MA: MIT Press.
- Chomsky, N. (2003). *Chomsky on democracy & education* (C. P. Otero, Ed.). New York: Psychology Press.
- Chomsky, N. (2014). *Noam Chomsky: After 60+ years of generative grammar: A personal perspective*. Retrieved from <https://www.youtube.com/watch?v=Rgd8BnZ2-iw&t=4s>
- Dunn, M., Greenhill, S. J., Levinson, S. C., & Gray, R. D. (2011). Evolved structure of language shows lineage-specific trends in word-order universals. *Nature*, 473(7345), 79–82. Retrieved from <https://doi.org/10.1038/nature09923>

- Edelman, S. (in press). Verbal behavior without syntactic structures: Beyond Skinner and Chomsky. In C. Behme (Ed.), *Chomsky's legacy*.
- Everaert, M. B. H., Huybregts, M. A. C., Chomsky, N., Berwick, R. C., & Bolhuis, J. J. (2015). Structures, not strings: Linguistics as part of the cognitive sciences. *Trends in Cognitive Sciences, 19*, 729–743. Retrieved from <https://doi.org/10.1016/j.tics.2015.09.008>
- Fernald, A., Marchman, V. A., & Weisleder, A. (2013). SES differences in language processing skill and vocabulary are evident at 18 months. *Developmental Science, 16*, 234–248. Retrieved from <https://doi.org/10.1111/desc.12019>
- Golumbia, D. (2009). *The cultural logic of computation*. Cambridge, MA: Harvard University Press. Retrieved from <http://www.jstor.org/stable/j.ctt13x0f7>
- Gottlieb, A. (2012, September 17). It ain't necessarily so. *The New Yorker*. Retrieved from <http://www.newyorker.com/magazine/2012/09/17/it-aint-necessarily-so>
- Grandy, R. E. (1980). Some thoughts on data and theory in linguistics. *PSA: Proceedings of the Biennial Meeting of the Philosophy of Science Association, 1980*, 605–609.
- Gray, R. D., & Atkinson, Q. D. (2003). Language-tree divergence times support the Anatolian theory of Indo-European origin. *Nature, 426*(6965), 435–439. Retrieved from <https://doi.org/10.1038/nature02029>
- Gray, R. D., Drummond, A. J., & Greenhill, S. J. (2009). Language phylogenies reveal expansion pulses and pauses in pacific settlement. *Science, 323*(5913), 479–483. Retrieved from <https://doi.org/10.1126/science.1166858>
- Hart, B., & Risley, T. R. (1995). *Meaningful differences in the everyday experience of young American children* (Vol. xxiii). Baltimore, MD: Paul H. Brookes Publishing.
- Henrich, J. (2015). *The secret of our success: How culture is driving human evolution, domesticating our species, and making us smarter*. Princeton, NJ: Princeton University Press.
- Hoff, E. (2003). The specificity of environmental influence: Socioeconomic status affects early vocabulary development via maternal speech. *Child Development, 74*, 1368–1378. Retrieved from <https://doi.org/10.1111/1467-8624.00612>
- Horgan, J. (2016). *Noam Chomsky is so antiestablishment he disses himself*. Retrieved from <https://blogs.scientificamerican.com/cross-check/noam-chomsky-is-so-anti-establishment-he-disses-himself/>
- Ibbotson, P., & Tomasello, M. (2016, November). Evidence rebuts Chomsky's theory of language learning. *Scientific American*. Retrieved from <https://www.scientificamerican.com/article/evidence-rebuts-chomsky-s-theory-of-language-learning/>
- James, W. (1909). *The meaning of truth*. New York, NY: Cosimo.
- Katz, Y. (2012, November 1). Noam Chomsky on where artificial intelligence went wrong. *The Atlantic*. Retrieved from <https://www.theatlantic.com/technology/archive/2012/11/noam-chomsky-on-where-artificial-intelligence-went-wrong/261637/>
- Kenneally, C. (2008). *The first word: The search for the origins of language* (Reprint edition). New York, NY: Penguin.
- Kirby, S., Cornish, H., & Smith, K. (2008). Cumulative cultural evolution in the laboratory: An experimental approach to the origins of structure in human language. *Proceedings of the National Academy of Sciences, 105*, 10681–10686. Retrieved from <https://doi.org/10.1073/pnas.0707835105>
- Kirby, S., Dowman, M., & Griffiths, T. L. (2007). Innateness and culture in the evolution of language. *Proceedings of the National Academy of Sciences, 104*, 5241–5245. Retrieved from <https://doi.org/10.1073/pnas.0608222104>
- Kirby, S., Griffiths, T., & Smith, K. (2014). Iterated learning and the evolution of language. *Current Opinion in Neurobiology, 28*, 108–114. Retrieved from <https://doi.org/10.1016/j.comb.2014.07.014>
- Kunstler, J. H. (1994). *The geography of nowhere: The rise and decline of America's man-made landscape*. New York, NY: Free Press.
- Lakoff, R. T. (2000). *The language war*. Berkeley: University of California Press.
- LaPolla, R. J. (2015). On the logical necessity of a cultural and cognitive connection for the origin of all aspects of linguistic structure. In R. de Busser & R. J. LaPolla (Eds.), *Language structure and environment: Social, cultural, and natural factors* (pp. 31–44). Amsterdam, The Netherlands: John Benjamins Publishing Co.
- Lin, F. Y. (2017). A refutation of universal grammar. *Lingua, 193*, 1–22. Retrieved from <https://doi.org/10.1016/j.lingua.2017.04.003>
- Lupyan, G., & Dale, R. (2016). Why are there different languages? The role of adaptation in linguistic diversity. *Trends in Cognitive Sciences, 20*, 649–660. Retrieved from <https://doi.org/http://dx.doi.org/10.1016/j.tics.2016.07.005>
- MacDonald, M. C. (2013). How language production shapes language form and comprehension. *Frontiers in Psychology, 4*. Retrieved from <https://doi.org/10.3389/fpsyg.2013.00226>
- Massaro, D. (2017). Five decades after Chomsky: An experience-based awakening. *American Journal of Psychology, 130*, 232–243. Retrieved from <https://doi.org/10.5406/amerjpsyc.130.2.0232>
- Mikolov, T., Chen, K., Corrado, G., & Dean, J. (2013). Efficient estimation of word representations in vector space. *Computation and Language*. Retrieved from <https://arxiv.org/abs/1301.3781>
- Norvig, P. (2011). *On Chomsky and the two cultures of statistical learning*. Retrieved from <http://norvig.com/chomsky.html>



- Oller, D. K., & Griebel, U. (Eds.). (2004). *Evolution of communication systems: A comparative approach*. Cambridge, MA: Bradford.
- Schütze, C. T. (2016). *The empirical base of linguistics: Grammaticality judgments and linguistic methodology*. Berlin, Germany: Language Science Press. Retrieved from <http://www.oapen.org/search?identifier=603356>
- Smith, E. A. (2010). Communication and collective action: Language and the evolution of human cooperation. *Evolution and Human Behavior*, 31, 231–245. Retrieved from <https://doi.org/10.1016/j.evolhumbehav.2010.03.001>
- Thompson, B., Kirby, S., & Smith, K. (2016). Culture shapes the evolution of cognition. *Proceedings of the National Academy of Sciences*, 113, 4530–4535. Retrieved from <https://doi.org/10.1073/pnas.1523631113>
- Tomasello, M. (2008). *Origins of human communication*. Cambridge, MA: MIT Press.

## HOW NOT TO PLAY THE GAME OF PSYCHOLOGICAL INQUIRY

### The Seven Deadly Sins of Psychology: A Manifesto for Reforming the Culture of Scientific Practice

By Chris Chambers. Princeton, NJ: Princeton University Press, 2017. 288 pp. Hardcover, \$29.95.

In another lifetime, when I was a fresh assistant professor at the University of Wisconsin, a colleague and I were discussing his research. I asked him, “Yes, but how important is this finding really?” He replied immediately, “ $p < .05$ .” I was a little taken aback to hear that this statistical value was a measure of importance. I thought I was somewhat of a lone voice because our reputable journals were requesting even more inferential statistics to perhaps justify a “science” publication. Now, many decades later, Chris Chambers offers a manifesto that rightly denigrates inferential statistics as part of his list of seven sins of psychological inquiry.

#### *The Deadly Sins*

So what are the seven deadly sins and the concomitant commandments that should be followed to lead a pure scientific life? First on the list is our intrinsic original sin of bias, most notably confirmation bias. Psychologists and behavioral scientists are not immune to seeking and favoring evidence that support their beliefs and ignoring or denigrating results that somehow disagree with these beliefs. It is not necessary to sermonize readers of this journal about this persistent bias. Confirmation bias was very apparent in the 2016 election and its aftermath, but it is

not limited to politics. Mercier and Sperber (2017) provide a rationalization for confirmation bias that fits well in much of psychological inquiry: Winning arguments takes precedence over truth.

Chambers shows that, even in the context of the respected hypothetico-deductive model of the scientific method, researchers have evolved various techniques to instantiate confirmation bias. Thus this venerable method does not ensure that confirmation bias does not enter the everyday life of scientific inquiry. Our science rewards novel and positive results, not negative findings or replications of previous results in the literature. This payoff system encourages investigators to game the system. Thus, the literature tends to archive only positive findings; negative findings are demoted to the “file drawer” in good faith or even trashed by scientists with less of a conscience.

Seeking positive results can seamlessly convert researchers to Harking (Hypothesizing After Results Are Known) and other ritualistic strategies to guarantee success. One strategy is to change the investigator’s initial hypothesis to one compatible with the outcome of the research. Another colleague confided to me that once the results were in, he realized how his initial predictions from Freudian theory were misguided. Thus, his opinion and resulting publication postulated that Freudian theory was able to survive yet another critical challenge.

The second sin is to exploit the hidden flexibility we have as researchers to maintain our good standing in the club. Inferential statistics provide many ways to lie. If an investigator has several possible dependent measures to draw from, then the odds of one of them being significant are greatly increased. Another strategy is to test additional participants until the magical  $p$  value is obtained. Another gift of flexibility is that we are free to double check the results when they disagree with our wishes, but of course there is no need to double check the results when they support them.

Chambers captures a variety of flaws encompassed in the third sin of unreliability. First on the list is our field’s reluctance to replicate (“Replication Crisis,” 2017), and when it does occur with different outcomes, it is too easily palmed off as not a true replication. Handicapping replication research are the typical ills of inquiry, including lack of power, and statistical fallacies, as well as the societal ills of disclosing important details of the study and reluctance to admit being wrong.

Although it occurs less than it should in our discipline, replication research also promotes positive