

Conceptualizing Evolution Education

Conceptualizing Evolution Education:

*A Corpus-Based Analysis
of US Press Discourse*

By

Shala Barczewska

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PREFACE

Ever since the 1920s, politicians, educators, religious leaders, parents, and scientists in the United States have been in conflict over how to teach man's origins in the science classroom. Rather than dissipating with time, the dispute seems to be intensifying, and it shows no sign of abating. From January 1 to March 31, 2016, The National Center for Science Education (NCSE) noted eleven states across the nation in which citizens and lawmakers have addressed issues related to evolution education.¹

According to Gallup (Newport 2014), 42% of Americans believe God created humans in their present form, 31% believe God guided the process of human evolution, and 19% believe that no divine being was involved. These numbers represent a sharp divide. While this is often presented as a conflict between the groups mentioned—e.g., religious leaders versus scientists or educators versus parents—the reality is much more complicated (cf. Numbers 1992, xiv–xv). People within each of these groups represent different viewpoints reflecting, to different extents, the divisions within American society as a whole.

Moreover, as chapter 1 demonstrates, these viewpoints do not fit into any convenient dichotomies. “Faith versus Science” falls apart with the NCSE’s publication of *Voices for evolution* (Sager 2008), which comprises statements by religious leaders in support of Darwinian evolution, on the one hand, and Discovery Institute’s list of scientists who doubt Darwinism on the other (“A Scientific Dissent from Darwinism” 2001–). What is more, just as there are people of faith who accept Darwinian evolution, there are also agnostics who are critical of the theory (Luskin 2013). “Creation versus Evolution” reveals itself to be overly simplistic when looking at the range of views currently held by the American people—from a literal understanding of the seven-day creation in Genesis; to a God-instigated, but not God-guided, evolution; to pure, materialistic chance. There is even “The Third Way” movement, which was initiated in May 2014 by James Shapiro, Raju Pookottil, and Denis Noble (Shapiro et al. 2016). Not even the current legislation disputes or school board cases

¹ In alphabetical order, these states are Alabama, Alaska, Florida, Idaho, Iowa, Kentucky, Louisiana, Mississippi, Oklahoma, South Dakota, and West Virginia.

fit a discursively convenient pattern. True, some argue for teaching an alternative to evolution, such as creation science or intelligent design; however, these suggestions are increasingly rare. Other proposals focus on highlighting whether evolution is a *theory* or a *fact*. Most recently, there is a trend to propose bills that support teachers in discussing potentially controversial science subjects, including evolution and climate change, with the caveat they stick to peer-reviewed scientific publications and do not discuss religious issues (e.g., Tenn. Code Ann. § 49-6-1030 [2012]). In the press, these bills are often forced into the existing discourse of “introducing creationism,” even though the bills do always not fit neatly into that pattern.

I hope at this point it is possible to see the convoluted knot that has been woven from the multiple discourses surrounding the topic of evolution education. In fact, it is because of this complexity that I try to avoid referring to those who doubt evolution as “creationists,” unless I am referring to a group of people who so define themselves. For the most part, I use only those labels that are accepted by the proponents of the movement they describe. Exceptions are “anti-evolutionists” and “accommodationists,” which appear in scare quotes because they are often used as derogatory labels by outsiders.

“Anti-evolutionist” is used as an expedient cover term for those who doubt the sufficiency of purely natural forces in explaining life’s variety. Scare quotes are necessary, as many of these doubters do not have a problem with evolution within kinds or species and some even allow for change between species. In fact, design proponent David Klinghoffer (2016) claims that intelligent design “*is a theory of evolution*, seeking to explain why biological diversity flowers and grows in the manner it does. It’s just not *Darwin’s* theory of evolution”. Thus, it is not exactly accurate to label this movement “anti-evolution.” Instead, I often use *Darwinist* or *Darwinian evolution* in place of *evolutionist/evolution* and *Darwin-doubter* appears in place of “*anti-evolutionist*.” Nevertheless, for the purposes of this book, *evolution* should be understood as the theory of biological evolution that has developed from Darwin’s (1859) original theory.

“Accommodationist” is a label used to mark agnostic or atheistic evolutionists who accept others’ belief in God and evolution as valid. Jerry Coyne (2016) is one evolutionary biologist and blogger who uses this term to identify and criticize groups like the NCSE, which claims that religious belief and evolution are not necessarily in conflict. For this reason, I try to avoid describing the debate in terms of “SCIENCE-vs.-RELIGION”; instead, I follow Eugenie Scott, founding director of the NCSE, and consider it a

question of philosophy, which I understand as encompassing worldview and a person's understanding of the role a divine entity may or may not have played in the development of life on earth.

Because this debate not only touches on beliefs about life's origins, but also affects how those beliefs will or will not be taught to impressionable school children, it tends to be highly emotional. Therefore, it is necessary to emphasize that it is not my intent to discuss the content of the positions presented. Instead, I propose a *linguistic* exploration of how the current debate over teaching biological evolution is construed in the US press. In other words, the focus is on the way in which *language* is used to present the controversy to the public. This is achieved through triangulation of theories from the fields of Cognitive Linguistics² and corpus linguistics, along with elements of pragmatics³ and discourse analysis.

Despite the abundance of books written on this deeply entrenched debate, little has succeeded in improving mutual understanding. It is hoped that this book can be a step forward by identifying ways in which linguistic choices help and/or hinder communication in this and other controversies.

² Cognitive Linguistics is a specific theory of linguistics and is capitalized to distinguish it from other theories of linguistics that invoke cognitive processes. This is explained in greater detail at the beginning of chapter 3.

³ Cognitive Linguistics treats semantics and pragmatics as points on a continuum rather than distinct fields of study (cf. Langacker 2008, 39–40); however, the term pragmatics is used in this book to refer to theories and scholars commonly associated with this field as a matter of convenience.

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LIST OF ABBREVIATIONS

ab	Abstract
ACLU	American Civil Liberties Union
<i>AHD</i>	<i>The American Heritage Dictionary of the English Language</i>
art.	Number of articles
BNC	British National Corpus
CADS	Corpus-Assisted Discourse Studies
CDA	Critical Discourse Analysis
CDS	Current Discourse Space
COCA	<i>The Corpus of Contemporary American English</i>
COHA	<i>The Corpus of Historical American English</i>
<i>E</i>	EE312 “Evolution” sub-corpus
ED	Editorials, letters, and opinion pieces in the EE312 and TIME25 corpora
EE312	Corpus of reporting on evolution education from 2003–2012
Freq.	Frequency of occurrences
H	Idealized hearer
ICM	Idealized Cognitive Model
ID	Intelligent design
IDC	Intelligent design creationism
L1	Word one to the left to the word under investigation
MAG	Marks magazine articles in the EE312 corpus
<i>N</i>	EE312 “Neutral” sub-corpus
N.	Number
NCSE	National Center for Science Education
NABT	National Association of Biology Teachers
NEWS	Marks news articles in the EE312 and TIME25 corpora
NOW	<i>Newspapers on the Web</i> Corpus
<i>O</i>	EE312 “Open” sub-corpus
<i>OED</i>	<i>Oxford English Dictionary</i>
<i>OxD</i>	<i>Oxford Dictionaries</i>
R1	Word one to the right to the word under investigation
S	Idealized speaker
SBOE	State board of education
TIME25	Corpus of reporting on biological evolution from 1923–1932, largely comprised of articles from <i>Time</i> magazine
ww.	Number of words

INTRODUCTION

Discourse analysts, cognitive linguists, and corpus linguists all approach language, or more precisely the meaning expressed through language, as both a product and shaper of society: “Texts have causal effects—i.e. they bring change [...] in our knowledge [...], our beliefs, our attitudes, values, and so forth. They also have longer-term causal effects [...] shaping [...] identities” (Fairclough 2004, 8).

This is because “[t]he social and cultural world that we as human beings inhabit exists, and is expressed and recorded, to a very large degree by means of language” (McEnery and Hardie 2012, 230). Language presupposes meaning. In outlining the basic presumptions behind Cognitive Linguistics, Geeraerts (2006, 4) states, “[m]eaning is not just an objective reflection of the outside world, it is a way of shaping that world. You might say that it construes the world in a particular way, that it embodies a perspective onto the world.” This understanding of meaning informs both cognitive semantics and cognitive grammar, making them two points on a continuum within Cognitive Linguistics, rather than distinct fields.

Nevertheless, to date, most research applying Cognitive Linguistics to discourse analysis has been restricted to aspects of the conceptual metaphor theory. For alternative areas of linguistic analysis, researchers have tended to look to Halliday’s functional grammar and the wider field of pragmatics (cf. Hart and Lukeš 2007).¹ Although these studies have provided interesting insights, I believe that Cognitive Linguistics has much more to offer discourse analysis. It is my hope that this book can contribute to the development of a growing interest in Cognitive Pragmatics (Bara 2010; Schmid 2012) and the Cognitive Linguistic Approach to discourse analysis (Hart and Lukeš 2007; Hart 2011a, 2013, 2014), particularly in connection with the application of the tools of corpus linguistics.²

¹ Oakley (2005), Hart (2011a, 2013, 2014), and articles in a volume edited by Hart and Lukeš (2007) are exceptions.

² This also in part responds to Croft (2009) and the need for a more social approach to Cognitive Linguistic research and application.

Not only does integration of Cognitive Linguistics with corpus-assisted discourse analysis enhance research results, but it also provides a deeper understanding of how cultural debates are construed. In the case of the debate over evolution education in the United States, a better understanding of the debate's construal in the press may open the reader's eyes to elements of the controversy that often remain hidden. Even more importantly, the theories of Cognitive Linguistics may also motivate proposals for improving communication within the debate by suggesting alternative construals. Furthermore, these applications can be adapted to discourses on other controversial issues in the American "culture wars" such as abortion and gun control.³

The Controversy over Teaching Evolution in the US

Although the theory of evolution has been controversial since the publication of *On the Origin of Species* in 1859, it was generally accepted by biologists by 1900. Not until the horrors of World War I raised fears that the teaching of human evolution to children might result in a society without morals did the debate intensify and rhetorical energy focus on the classroom. The most well-known result of this was the 1925 trial of John T. Scopes, accused of teaching the evolution of man while substituting for a biology class. Coined the "monkey trial," what originally began as a publicity stunt eventually became such a salient event in the US debate over evolution that it could be considered a *discursive event* (after Jäger and Maier 2009; see also Barczewska 2013), an event which continues to interact with and influence discourses surrounding the theory's teaching.

³ According to Dill and Hunter (2010), "[t]he central claim of the culture war hypothesis is that there has been a fundamental realignment within American public culture that, in turn, has generated significant tension and conflict in the social order." These tensions are rooted in differences regarding the source of moral authority—transcendent or personal—and are visible in a variety of realms of social interaction. What is more, expressing these tensions in terms of a culture war is fairly recent. COHA, the *Corpus of Historical American English* (Davies 2010–), notes the first occurrence in the 1990s, while COCA, the *Corpus of Contemporary American English* (Davies 2008–), records a significant increase in usage of the compound noun from 1990–1994 (0.43 ww./million) to 2010–2015 (1.19 ww./million). Moreover, according to NOW, *Newspapers on the Web* (Davies 2016–), this is a lexicalization that is specific to the United States (1.36 ww/million) and Australia (1.09 ww/million). Apart from these two countries, word frequencies peak at 0.51 ww./million (UK).

These discourses have shifted points of conflict over the years. In the 1920s the aim was to limit the teaching of biological evolution, particularly the evolution of man. As a result, the word *evolution* was virtually absent from course books published after the 1925 Scopes trial. This began to change in the 1950s, and in 1968, *Epperson v. Arkansas* made it illegal to ban the teaching of biological evolution. During the 1970s, creationism, or creation science, which explored scientific evidence for a young earth, became a popular alternative to evolution and bills were passed which guaranteed equal time to both approaches to origins. In the 1980s legal efforts focused on outlawing the teaching of creation science. These efforts were successful, when, in 1987, creation science was declared to be a religious doctrine and thus unconstitutional in the public school classroom (*Edwards v. Aguillard*). Current points of controversy include how to define science,⁴ whether or not intelligent design (ID) qualifies as a scientific theory,⁵ and whether or not the “strengths and weaknesses” of evolution should be taught—that is, whether or not peer-reviewed articles that challenge aspects of evolution may be discussed in science classes.⁶ These issues are presented in greater detail in the first chapter.

Language has played, and continues to play, a key role in the debate, and research continues to acknowledge its centrality (Nelkin 1987, 2004; Lessel 1989; Smout 1998; Sullivan 2000; McCune 2003; Thurs 2007), with schools being the locus of the conflict (Witham 2002).

Conceptualization

Conceptualization can be described as “the dynamic cognitive process involved in meaning-making as discourse unfolds” (Hart 2013, 1) or “the nature of dynamic thought to which language can contribute” (Evans 2007, 38). I have chosen to focus on the conceptualization of the debate because, according to the theories of Cognitive Linguistics, language does not simply describe an event or object as it *is*. Instead, grammatical and lexical choices reveal the speaker’s or writer’s perspective on a given event. Just as the participants in the debate over evolution each have their

⁴ Instances of such debates over science standards are Kansas (2005, 2007), Ohio (2004, 2006), and Texas (2009, 2011, 2013).

⁵ *Tammy Kitzmiller, et al. v. Dover Area School District, et al.* 400 F. Supp. 2d 707, Docket no. 4cv2688 (M.D. Pa. 2005).

⁶ Examples include bills passed in Louisiana and Tennessee in 2012.

own way of conceptualizing human origins, so also they, and the journalists, conceptualize the debate over evolution education differently.

As an abstract noun, *conceptualization* refers to a cognitive process involving meaning creation. Langacker (2008, 30), whose work in construal is key to the theoretical basis of my research, explains conceptualization as follows:

Conceptualization is broadly defined to encompass any facet of mental experience. It is understood as subsuming (1) both novel and established conceptions; (2) not just “intellectual” notions, but sensory, motor, and emotive experience as well; (3) apprehension of the physical, linguistic, social, and cultural context; and (4) conceptions that develop and unfold through processing time (rather than being simultaneously manifested). So even if “concepts” are taken as being static, conceptualization is not.

What Langacker means is that conceptualizations are “negotiated by interlocutors based on mutual assessment of their knowledge, thoughts, and intentions” (2008, 4).⁷ These mental processes cannot be studied directly by the researcher because

[a]s a target of analysis, conceptualization is elusive and challenging, but it is not mysterious or beyond the scope of scientific inquiry. Cognitive semantics provides an array of tools allowing precise, explicit descriptions for essential aspects of conceptual structure. These descriptions are based on linguistic evidence and potentially subject to empirical verification. (Langacker 2008, 4)

That is to say, what the researcher has available are the words chosen by the speaker/writer. Because a person’s conceptualizations of the world are communicated through the linguistic expressions he/she uses (cf. Lakoff [1992] 2006), these provide a link to the speaker/writer’s way of viewing a given situation (cf. Cacciari 1998). I have adopted this understanding of conceptualization. It highlights the important role linguistic choice plays in text construction and draws attention to the different linguistic tools that journalists utilize to stimulate perception(s) or image(s) in order to convey their own unique perspectives on the teaching of evolution and its proponents/opponents. As Turton (2003, 4) observes in his research into the language used to talk about forced migration,

⁷ Although Langacker notes that conceptualization is grounded in both physical and social interaction, it is the latter that is the primary focus in this book.

to conceptualise something is to construct it rather than to define or describe it and [...] the metaphorical language we use to talk about migration carries with it certain implications for the way we think about, and therefore act towards, migrants.

It follows that the language used in the press to talk about biological evolution, science, and education, both metaphorical and literal, affects more than the way these theories are viewed in society. It also has consequences—it influences the way we perceive the people involved in the debate, including Darwinists and Darwin-doubters, scientists and science teachers.

With this understanding of conceptualization in mind, it is necessary to emphasize that the gerund, *conceptualizing*, was chosen for the title of this book. This choice was made to emphasize the *dynamic* nature of conceptualization, which changes and develops with each contribution to the discourse (cf. Langacker's [2001, 2008] current discourse space (CDS) discussed in chapter 3). In particular, this debate is constantly evolving as representatives of different viewpoints explore new linguistic tools and framing strategies for presenting their positions.

A number of theories within Cognitive Linguistics are drawn on for assistance in analyzing conceptualizations of the debate and its participants. The theoretical basis for this project is Langacker's (1993, 2001, 2007, 2008) description of cognitive grammar. It is supplemented with aspects of force dynamics (Talmy 1988, 2000), conceptual metaphor (Lakoff and M. Johnson 1980; Lakoff [1992] 2006), mental spaces and conceptual blending (Fauconnier and Turner 2002, 2003), and frame semantics (Fillmore 2006). These theories are explored for their applicability to discourse analysis in chapter 3 and applied in chapters 4–7.

A Cognitive Pragmatics Approach

Approaching language from the perspective of Cognitive Linguistics by no means limits analysis to the individual conceptualizer. On the contrary, Cognitive Linguistics attempts to explain the link between the conceptualizer, his/her conceptualizations, and his/her embodied experience in the context of his/her interactions with other conceptualizers. The result is a usage-based model that aims at a holistic approach to meaning informed by research in other disciplines, particularly in other branches of cognitive science (Geeraerts 2006).

This stands in sharp contrast with those theories of language that separate the study of language into the categories of syntax, semantics, and pragmatics. Within such an understanding of language, there are two

predominant approaches to meaning. Structuralists recognize word meaning in relation to its features, treating language as a closed system, such as Saussure's metaphorical reference to a chess match (Geeraerts 1998, 48; after Saussure 1916, 125–27).⁸ Alternatively, linguists working within formal semantics evaluate meaning in terms of truth-conditions—that is, whether or not it is possible to conceive of a world in which the expressed proposition is true. As a result, utterance meaning—which takes context, felicity conditions, and social effects into consideration—is relegated to the category of pragmatics.⁹

Cognitive Linguistics rejects such divisions, arguing that lexical items serve as prompts to encyclopedic knowledge, which is then used and manipulated by discourse participants in real-time meaning construction (Evans and Green 2006). It also discards the notion of fixed categories or context-independent meaning in favor of prototype, core, or salient meanings that reflect encyclopedic knowledge. As a result, what was formerly viewed as a sharp distinction between semantic and pragmatic meaning is now viewed as a gradient (Langacker 2008, 40). These distinctions fade because each lexical and grammatical choice has the power to provide a unique perspective, activate frames, expose presupposed value scales, and activate conceptual mappings between a plethora of inputs.

Such an approach does not disregard questions raised in the field of pragmatics, but rather offers a different approach or explanation consistent with research in the cognitive sciences as a whole.

Within cognitive frameworks for studying meaning construction, many standard issues of Pragmatics remain as important as ever—we seek to account for scalar phenomena, speech acts and performatives, presupposition, referential opacity, so-called figurative speech, metonymic pragmatic functions, and implicature—but old problems are framed in novel ways. (Fauconnier 2006, 659)

For this reason, there is much ground for integration. For example, my analysis was conducted with consideration of the notions of speech acts (Austin 1962; Searle 1962) and the categories of presupposition, implicature, and explicature (Grice 1975).

⁸ See Geeraerts (2010) for a review of the developments in theories of linguistic meaning over the past 150 years.

⁹ The use of *relegated* is intentional here, as “wastebasket” has been used metaphorically to refer to this field of linguistic research (Fetzer 2011, 25).

Utilizing Corpus-Assisted Discourse Studies (CADS)

As Harder (2011, 306) states, “invoking a conceptualization in communication is unsuccessful if the conceptualization is not mapped onto the discourse target as part of the process of understanding the utterance as a whole.” One way in which a conceptualization is mapped onto the understanding of an utterance is repetition. In other words, we are able to assess the extent to which a conceptualization is entrenched in a discourse based on how frequently it occurs (Harder 2011, 311; Stubbs 1996, 92). In the current study of press discourse, reoccurrence of (a) particular metaphor(s) and/or frame(s) suggests the existence of an entrenched discourse. Such proliferation becomes visible when a large body of text is analyzed electronically. “By bringing together many instances of a word, a concordance provides evidence of its range of uses and therefore of its meanings [...]” (Stubbs 2004, 109). The field of linguistics that uses software to study large bodies of texts is known as corpus linguistics. Another advantage of a computer-aided analysis is the ability to identify words that are uniquely frequent to a given text or group of texts and support these findings with statistical data.

While corpus-assisted analysis does not limit itself to a particular school of linguistic thought, it does represent a usage-based approach to meaning and thus corresponds to the theoretical framework of Cognitive Linguistics. In fact, the two approaches complement each other well (cf. Gries 2009).

Admittedly, some researchers have criticized the application of corpus techniques in discourse analysis for fear that using an automated retrieval system runs the risk of ignoring context. However, this critique is limited, as illustrated by those researchers who have competently incorporated insights from both context and corpus lines when discussing their results (Stubbs 1996; Baker 2006). This is exemplified by the CADS approach, which Partington (2010, 88), who coined the phrase, summarizes as “the investigation and comparison of features of particular discourse types, integrating into the analysis, where appropriate, techniques and tools developed within corpus linguistics.” Thus, the statistical analyses made possible through corpus linguistics are used in conjunction with other theoretical approaches to linguistic and non-linguistic meaning. This is also the methodology used in the research conducted here.

Defining US Press Discourse

The US press has been chosen as a point of departure for this endeavor; however, the US press does not represent one homogeneous perspective. Not only is it comprised of numerous publications written by individuals from a variety of backgrounds, but it also includes a range of genres and styles. Moreover, each paper has its own set of readers, with whom it dialogues through letters to the editor as well as comments written on its website.

Recognizing the impossibility of conducting a comprehensive study of all press coverage of the debate, I decided to follow other CADS scholars and aim for a representative collection of articles on evolution education. Furthermore, I also wanted to have a contemporary picture of the controversy that would include some of the more recent legislative bills, court cases, and decisions made by state boards of education (SBOE). For this reason, January 2003–December 2012 was chosen as the range of dates for the primary corpus, which I refer to as EE312 (**E**volution **E**ducation **2003–2012**). These years include the Kansas SBOE hearings and the Dover, PA trial, both in 2005, as well as the controversial legislation passed in Tennessee in 2012, all of which are discussed in chapter 1. This corpus includes regional and national publications, with articles taken from widely circulated national papers (*Los Angeles Times*, *The New York Times*, *The Wall Street Journal*, and *The Washington Post*) as well as newspapers and magazines published in states where the evolution debate has seen recent flare-ups, such as Tennessee and Texas.

In addition, because reference to the 1925 Scopes trial continues in contemporary coverage, a smaller corpus was collected from *TIME* magazine, the only magazine or newspaper found to have digitalized articles dating back to the 1920s. These articles were supplemented with thirteen short articles written by *Baltimore Evening Sun* reporter H.L. Mencken (July 1925) on the trial and two longer texts written by prosecuting lawyer William Jennings Bryan (1922, 1925). This smaller corpus is used for comparison purposes and is labeled TIME25 to highlight both the primary source and focal date of the Scopes trial. A more detailed description of the two corpora is provided in chapter 2.

The term *discourse* is generally recognized as having three basic meanings: the words above the clausal level (e.g., text structure), the way in which language is used (e.g., pragmatics), and the interaction between language and society (e.g., discourses on the environment, discourses on education) (cf. Baker 2006, 3). This project is most concerned with the