

Data-Driven *Text Adaptation*
for Academic Reading Materials

Tan Jin

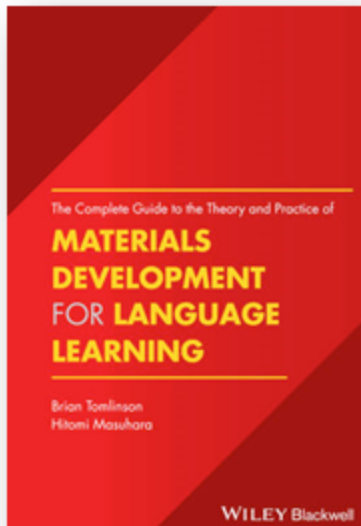
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Text Adaptation

Adaptation



“Materials adaptation is a general term for the process that involves *making changes* to existing materials to *better suit* specific learners, teachers and contexts for the purpose of facilitating effective learning.”

Tomlinson, B., & Masuhara, H. (2018). *The complete guide to the theory and practice of materials development for language learning*. Hoboken, NJ: Wiley-Blackwell.

Text Adaptation in our context



is to help teachers to make necessary *linguistic adaptation* to authentic texts of academic English reading to ensure the *text complexity* is suitable for learners at **expected proficiency levels**

Jin, T., & Lu, X. (2018). A data-driven approach to text adaptation in teaching material preparation: Design, implementation and teacher professional development. *TESOL Quarterly*, 52(2), 457-467.

Outline

Part I text complexity

Concept 1 *Complexity Indices*

Part II linguistic adaptation

Concept 2 *Lexical Profiles*

Concept 3 *Syntactic Profiles*

Concept 1

Complexity Indices

Project 1
Matching Text

- The text, **Case A**, is selected from *Science*.
- Can you **match** **Case A** to *proficiency levels* of Chinese EFL learners in terms of text complexity?
- Please share with us the level you matched, as well as **your reasons** for doing so.

The social dilemma of autonomous vehicles

Jean-François Bonnefon¹, Azim Shariff^{2,*}, Iyad Rahwan^{3,†}

+ See all authors and affiliations

Science 24 Jun 2016:
Vol. 352, Issue 6293, pp. 1573-1576
DOI: 10.1126/science.aaf2654

Case A *Autonomous Vehicles*

[Article](#)[Figures & Data](#)[Info & Metrics](#)[eLetters](#)[PDF](#)

Codes of conduct in autonomous vehicles

When it becomes possible to program decision-making based on moral principles into machines, will self-interest or the public good predominate? In a series of surveys, Bonnefon *et al.* found that even though participants approve of autonomous vehicles that might sacrifice passengers to save others, respondents would prefer not to ride in such vehicles (see the Perspective by Greene). Respondents would also not approve regulations mandating self-sacrifice, and such regulations would make them less willing to buy an autonomous vehicle.

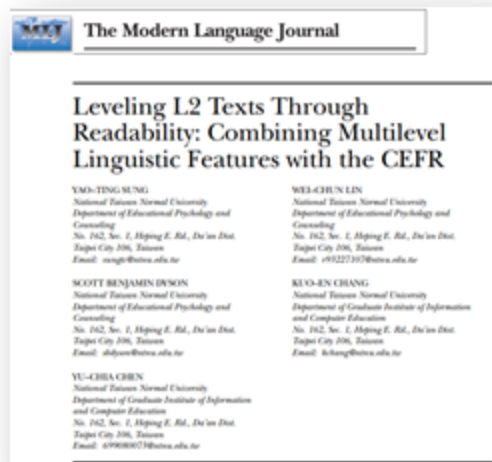
Science, this issue p. **1573**; see also p. **1514**

Matching Text

Chinese EFL learners (typical stages)	roughly equivalent to CEFR	tick the level you match for Case A
<i>primary graduate</i>	A2	
<i>junior secondary</i>	A2+	
<i>senior secondary</i>	B1	
<i>collegiate basic</i>	B2	
<i>collegiate intermediate</i>	B2+	
<i>collegiate advanced</i>	C1	

Project 1
Matching Text

The **Leveling** Issue



Matching texts to particular proficiency levels is **challenging**, even for experienced teachers

Sung, Y. T., Lin, W. C., Dyson, S. B., Chang, K. E., & Chen, Y. C. (2015). Leveling L2 texts through readability: Combining multilevel linguistic features with the CEFR. *Modern Language Journal*, 99, 371–391.

Data-Driven Measures

With the advent of corpus techniques, *numerous data-driven measures* are now available for characterizing text complexity

Jin, T., & Lu, X. (2018). A data-driven approach to text adaptation in teaching material preparation: Design, implementation and teacher professional development. *TESOL Quarterly*, 52(2), 457-467.

Educational Researcher

Coh-Metrix

Providing Multilevel Analyses of Text Characteristics

Arthur C. Graesser, Danielle S. McNamara, Jonna M. Kulikowich,

First Published June 1, 2011 | Research Article |



<https://doi.org/10.3102/0013189X11413260>

[Article information](#) ^

Article Information

Volume: 40 issue: 5, page(s): 223-234

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Received: April 01, 2011; Revisions received: May 06, 2011; Accepted: May 08, 2011

Complexity **Indices**

While not every aspect of text complexity (e.g., cultural knowledge) can be assessed, the quantifiable indices based on data-driven linguistic measures have *proven useful* for helping teachers determine the complexity levels of texts

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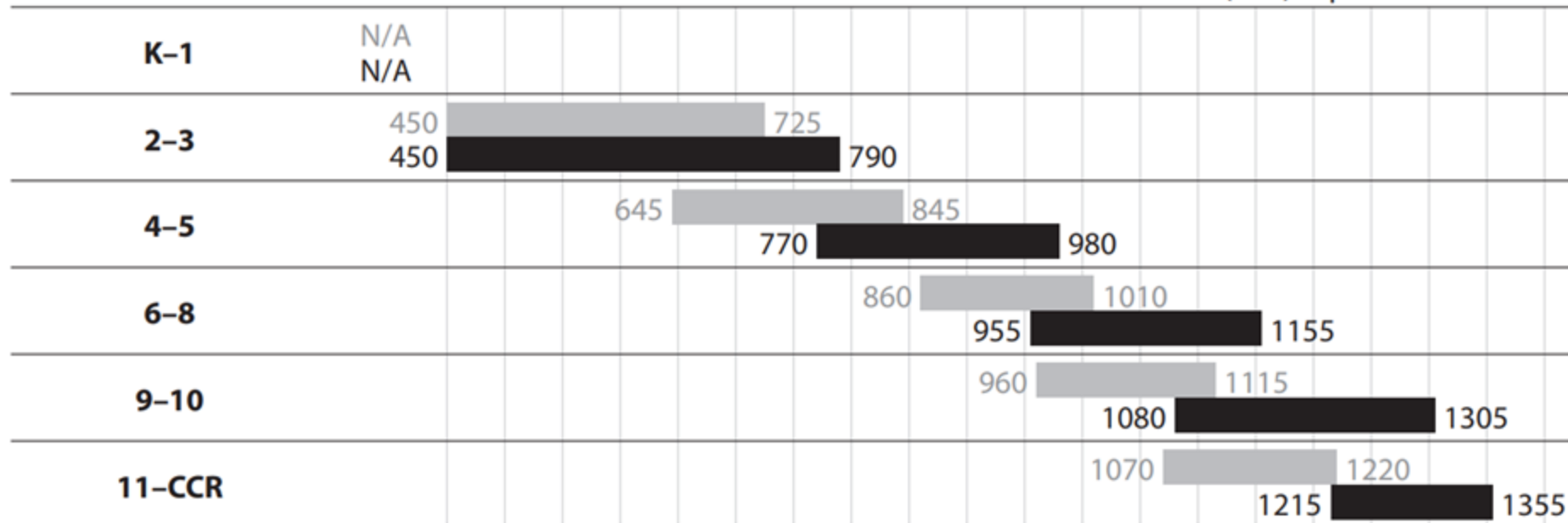
Lexile

One typical example is *Lexile*, in which a text complexity *staircase* is introduced that recommends accelerated levels from Grade 2 to Grade 12

Hiebert, E. H., & Mesmer, H. A. E. (2013). Upping the ante of text complexity in the Common Core State Standards: Examining its potential impact on young readers. *Educational Researcher*, 42(1), 44-51.

Text Complexity Grade Band in the Standards

Old Lexile Ranges
 Lexile Ranges Aligned to College and Career Readiness (CCR) Expectations



a text complexity **staircase** is introduced that recommends **accelerated levels** from Grade 2 to Grade 12

<http://journals.sagepub.com/doi/pdf/10.3102/0013189X12459802>

Concept 1

Complexity Indices

a range of *quantifiable indices* based on linguistic measures, in which a *text complexity staircase* is introduced to help teachers determine the complexity levels of texts

Our Solution

1 Benchmark Corpus

We constructed a large-scale *benchmark corpus* comprised of text samples representing the proficiency levels at six educational stages including *primary graduate*, *junior secondary*, *senior secondary*, *collegiate basic*, *collegiate intermediate*, *collegiate advanced*

Text samples include a *unique collection from teaching materials and exam papers*

educational stages	teaching materials	exam papers
primary graduate	the texts used in <i>teaching materials</i> for different grade levels in the English language curricular approved by the Chinese Ministry of Education	the texts employed in <i>exam papers</i> including <i>Senior High School Entrance Examination, College Entrance Examination, College English Test, Postgraduate Entrance Examination</i> etc.
junior secondary		
senior secondary		
collegiate basic		
collegiate intermediate		
collegiate advanced		

Our Solution

2 Linguistic Measures

We employed **15** linguistic measures which can represent the construct of text complexity and be meaningful to Chinese EFL teachers, including *lexical profiles* (**8**), *syntactic profiles* (**6**), and *text length* (**1**).

lexical profiles

- running words of a text are compared against *vocabulary lists* provided in China's national English curriculum standards for different proficiency levels
- percentages of a text's running words *covered by vocabulary lists* produce the lexical profiles of a text (see Jin, Li & Li, 2016)



vocabulary lists in curriculum standards

wordlist 1
primary graduate

wordlist 2
junior secondary

wordlist 3
senior secondary (a)

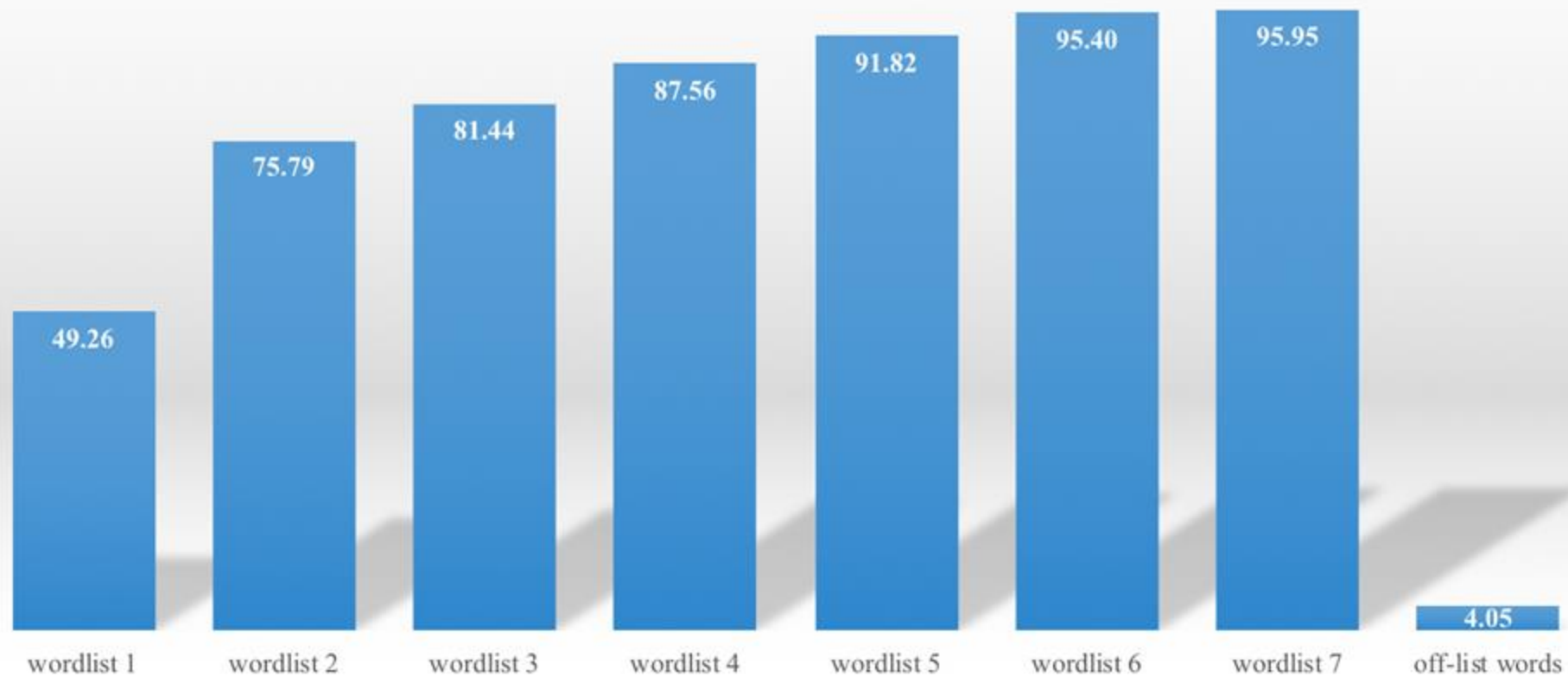
wordlist 4
senior secondary (b)

wordlist 5
collegiate basic

wordlist 6
collegiate intermediate

wordlist 7
collegiate advanced

Vocabulary Coverage



BRIEF REPORTS AND SUMMARIES

Vocabulary Coverage of Reading Tests: Gaps Between Teaching and Testing

Tan Jin, Yunting Li, Baichuan Li

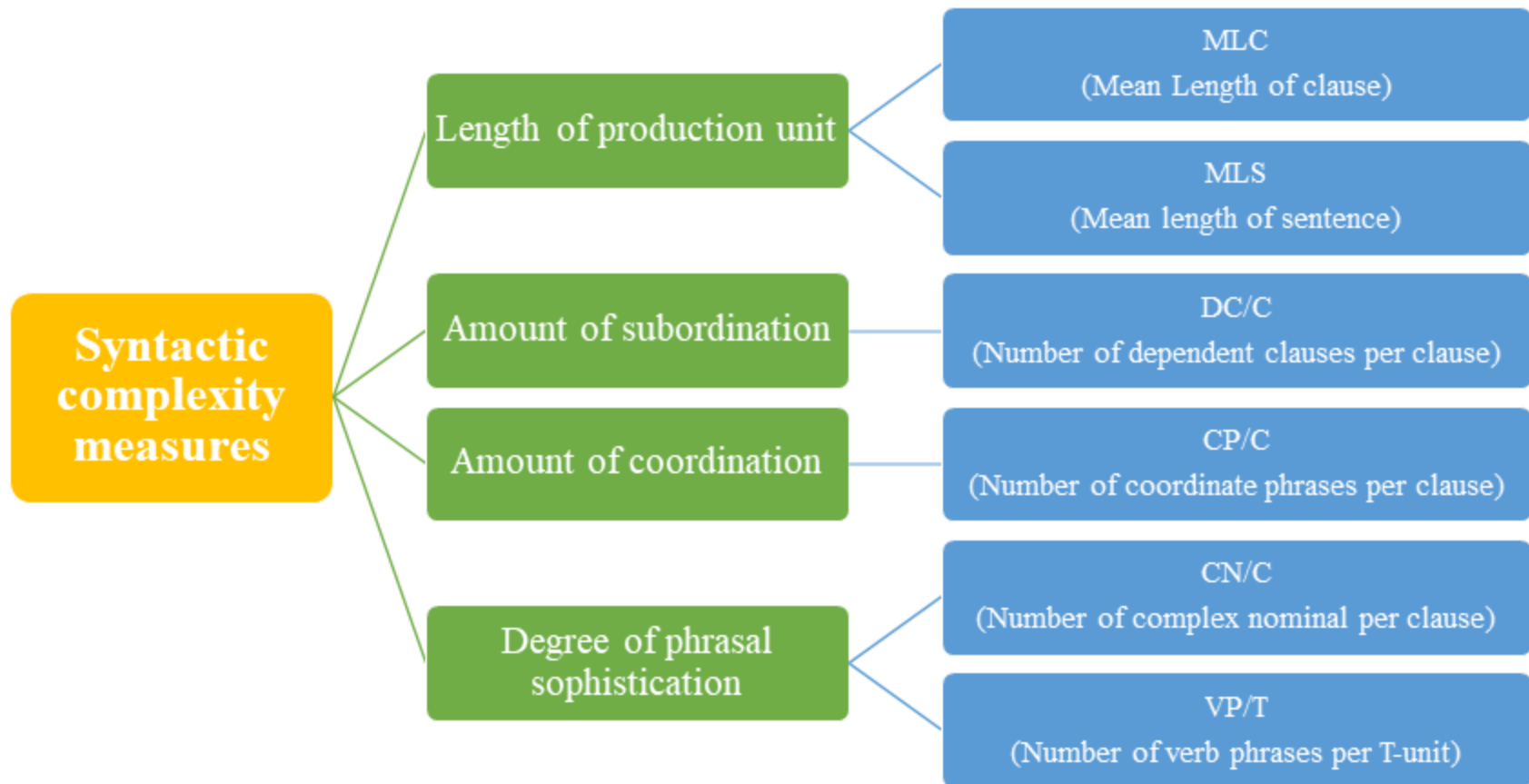
First published: 09 December 2016 | <https://doi.org/10.1002/tesq.324> | Cited by: 2

Jin, T., Li, Y., & Li, B. (2016). Vocabulary coverage of reading tests: Gaps between teaching and testing. *TESOL Quarterly*, 50(4), 955-964.

syntactic profiles

- ***L2 Syntactic Complexity Analyzer*** (L2SCA; Lu, 2017) is used to analyze the syntactic structures of the sentences in a text
- **6 specific measures** perceived to be ***useful*** and ***meaningful*** by Chinese EFL teachers have been selected to generate the syntactic profiles

Lu, X. (2017). Automated measurement of syntactic complexity in corpus-based L2 writing research and implications for writing assessment. *Language Testing*, 34(4), 493-511.



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Automated measurement of syntactic complexity in corpus-based L2 writing research and implications for writing assessment.
Language Testing, 34(4), 493-511.

Automated measurement of syntactic complexity in corpus-based L2 writing research and implications for writing assessment

Xiaofei Lu

The Pennsylvania State University, USA

Abstract

Research investigating corpora of English learners' language raises new questions about how syntactic complexity is defined theoretically and operationally for second language (L2) writing assessment. I show that syntactic complexity is important in construct definitions and L2 writing rating scales as well as in L2 writing research. I describe the operationalizations of syntactic complexity measurement in corpus-based L2 writing research, focusing on the Biber Tagger (Biber, Johansson, Leech, Conrad, & Finegan, 1999), Coh-Metrix (McNamara, Graesser, McCarthy, & Cai, 2014), and L2 Syntactic Complexity Analyzer (Lu, 2010), which are three tools commonly used to automate syntactic complexity analysis. A review of findings from recent corpus-based L2 writing studies on the relationship of syntactic complexity to L2 writing quality follows. I conclude with a discussion of the implications of these multiple perspectives on the definition of syntactic complexity in L2 studies.

Keywords

Construct definition, rating scales, second language writing, syntactic complexity, writing quality

Language Testing
2017, Vol. 34(4) 493-511
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sagepub.co.uk/journalsPermissions.nav
DOI: 10.1177/0265532217710675
journals.sagepub.com/home/ltj

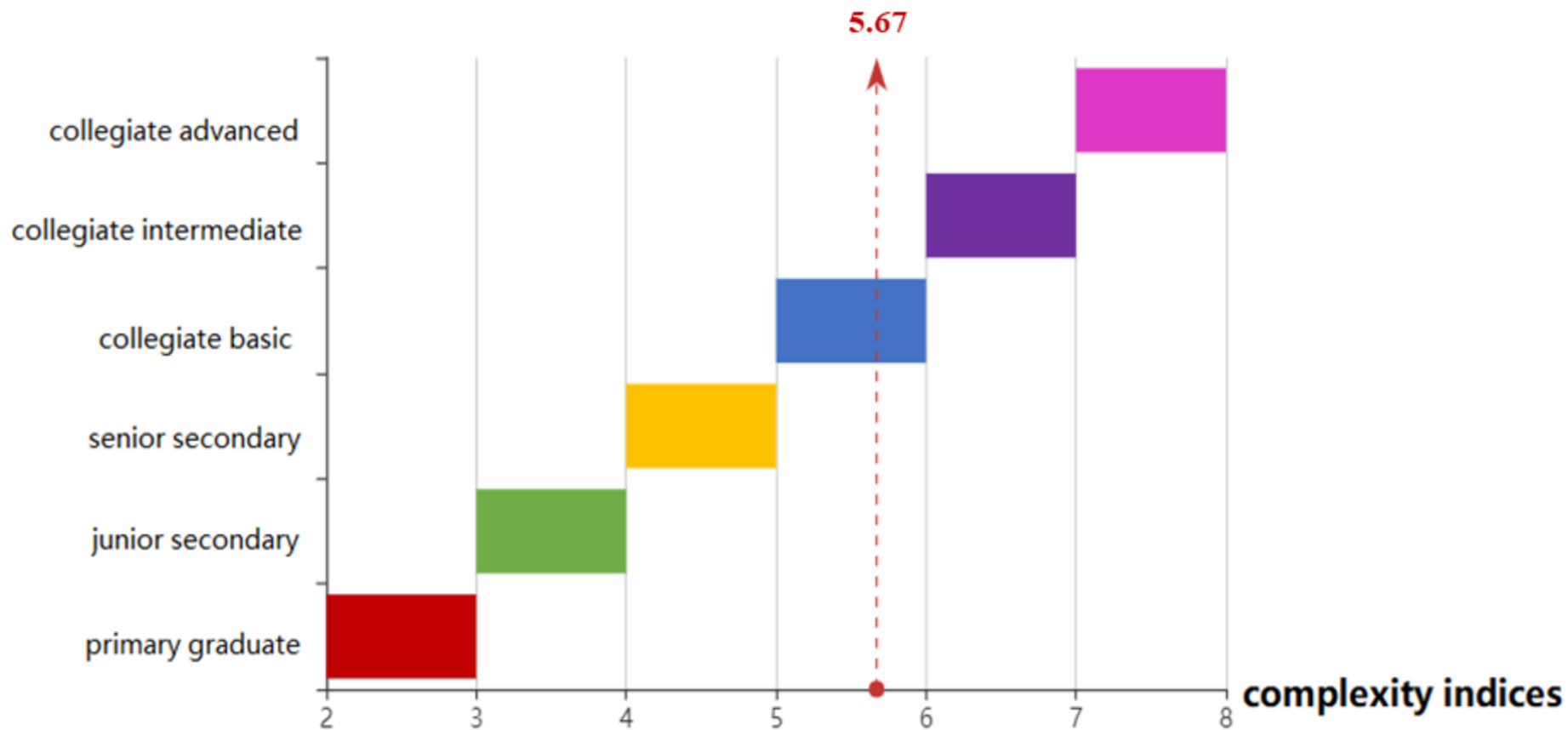

Our Solution

3 Complexity Indices

A machine learning algorithm, '*random forest*', was employed, with the **15 linguistic measures** adopted, to examine the text samples in the **benchmark corpus**, producing the **complexity indices** in the Chinese context

Based on the *complexity indices*,
a **text complexity staircase** is
introduced to help teachers
determine the complexity levels
of texts **in the Chinese context**





the red arrow in the middle points to the complexity level of a text

Project 1
Matching Text

The social dilemma of autonomous vehicles

Jean-François Bonnefon¹, Azim Shariff^{2,*}, Iyad Rahwan^{3,†}

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Codes of conduct in autonomous vehicles

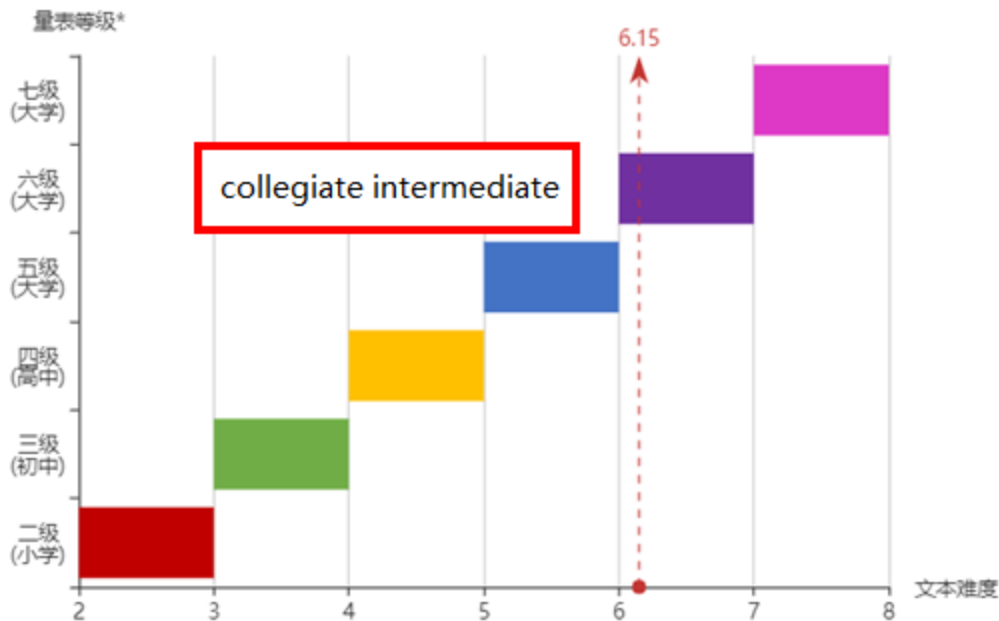
When it becomes possible to program decision-making based on moral principles into machines, will self-interest or the public good predominate? In a series of surveys, Bonnefon *et al.* found that even though participants approve of autonomous vehicles that might sacrifice passengers to save others, respondents would prefer not to ride in such vehicles (see the Perspective by Greene). Respondents would also not approve regulations mandating self-sacrifice, and such regulations would make them less willing to buy an autonomous vehicle.

Science, this issue p. **1573**; see also p. **1514**

英语阅读分级指难针



难度等级报告图



*参照《中国英语能力等级量表》(2018)

Concept 1 Summary

➤ based on the **15 linguistic measures** from *lexical profiles, syntactic profiles* and *text length*

➤ the **complexity index** of the text, **Case A**
autonomous vehicles

is **most likely**, *in the Chinese context*, **comparable to**

➤ the text samples from the *collegiate intermediate level* in the **benchmark corpus**

Concept 2
Lexical Profiles

complexity index
of the text, **Case A**
autonomous vehicles
is at the **collegiate**
intermediate level

Science

The social dilemma of autonomous vehicles

Jean-François Bonnefais¹, Azim Shariff^{2,3}, Iyad Rahwan^{1,4}

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Codes of conduct in autonomous vehicles

When it becomes possible to program decision-making based on moral principles into machines, will self-interest or the public good predominate? In a series of surveys, Bonnefais et al. found that even though participants approve of autonomous vehicles that might sacrifice passengers to save others, respondents would prefer not to ride in such vehicles (see the Perspective by Greene). Respondents would also not approve regulations mandating self-sacrifice, and such regulations would make them less willing to buy an autonomous vehicle.

Abstract

Autonomous vehicles (AVs) should reduce traffic accidents, but they will sometimes have to choose between two evils, such as running over pedestrians or sacrificing themselves and their passenger to save the pedestrians. Defining the algorithms that will help AVs make these moral decisions is a formidable challenge. We found that participants in six Amazon Mechanical Turk studies approved of utilitarian AVs (that is, AVs that sacrifice their passengers for the greater good) and would like others to buy them, but they would themselves prefer to ride in AVs that protect their passengers at all costs. The study participants disapprove of enforcing utilitarian regulations for AVs and would be less willing to buy such an AV. Accordingly, regulating for utilitarian algorithms may paradoxically increase casualties by postponing the adoption of a safer technology.

Case A

ETHICS

Which kind of
linguistic adaptation
is needed
if **Case A** is to be
used for **collegiate**
basic level

Science

The social dilemma of autonomous vehicles

Jean-François Bonnefais¹, Azim Shariff^{2*}, Iyad Rahwan^{3,†}

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Case A

ETHICS

We conducted a **survey**
among teachers and students,
and the most important **concern** is ...

creating a wordlist containing the words
that most students at the *collegiate basic level*
(*most are freshmen or sophomores*)
may not be familiar with

Project 2
Creating Wordlist

- One paragraph is selected from **Case A**.
- Can you **underline the words** that you think are challenging to most students at the *collegiate basic level* (freshmen or sophomores)?
- Please sort the words you identified by frequency of use, with **higher frequency first**.

Figuring out how to build ethical autonomous machines is one of the thorniest challenges in artificial intelligence today (22). As we are about to endow millions of vehicles with autonomy, a serious consideration of algorithmic morality has never been more urgent. Our data-driven approach highlights how the field of experimental ethics can provide key insights into the moral, cultural, and legal standards that people expect from autonomous driving algorithms. For the time being, there seems to be no easy way to design algorithms that would reconcile moral values and personal self-interest—let alone account for different cultures with various moral attitudes regarding life-life trade-offs (23)—but public opinion and social pressure may very well shift as this conversation progresses.


Bonnefon, J. F., Shariff, A., & Rahwan, I. (2016).
The social dilemma of autonomous vehicles. *Science*, 352(6293), 1573-1576.

Creating Wordlist

rank	word	rank	word	rank	Word
1		5		9	
2		6		10	
3		7			
4		8			

Project 2
Creating Wordlist

The Percentage Issue



The Modern Language Journal

The Percentage of Words Known in a Text and Reading Comprehension

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This study focused on the relationship between percentage of vocabulary known in a text and level of comprehension of the same text. Earlier studies have estimated the percentage of vocabulary necessary for second language learners to understand written texts as being between 95% (Laufer, 1989) and 98% (Hu & Nation, 2000). In this study, 661 participants from 8 countries completed a vocabulary measure based on words drawn from 2 texts, read the texts, and then completed a reading comprehension test for each text. The results revealed a relatively linear relationship between the percentage of vocabulary known and the degree of reading comprehension. There was no indication of a vocabulary "threshold," where comprehension increased dramatically at a particular percentage of vocabulary knowledge. Results suggest that **the 98% estimate** is a more reasonable coverage target for readers of academic texts.

no need to know all words;
< 2% unknown words
is a **reasonable** target for
reading materials

Schmitt, N., Jiang, X., & Grabe, W. (2011). The percentage of words known in a text and reading comprehension. *The Modern Language Journal*, 95(1), 26-43.

Concept 2

Lexical Profiles

- running words of a text are compared against *vocabulary lists* provided in China's national English curriculum standards for different proficiency levels
- percentages of a text's running words *covered by vocabulary lists* produce the lexical profiles of a text (see Jin, Li & Li, 2016)

Our Solution

1 Predicting Words

Using the *lexical profiles*, we can easily **predict the unknown words** for students at different proficiency levels in the Chinese context.

Figuring out how to build ethical autonomous machines is one of the thorniest challenges in artificial intelligence today (22). As we are about to endow millions of vehicles with autonomy, a serious consideration of algorithmic morality has never been more urgent. Our data-driven approach highlights how the field of experimental ethics can provide key insights into the moral, cultural, and legal standards that people expect from autonomous driving algorithms. For the time being, there seems to be no easy way to design algorithms that would reconcile moral values and personal self-interest—let alone account for different cultures with various moral attitudes regarding life-life trade-offs (23)—but public opinion and social pressure may very well shift as this conversation progresses.

Bonnefon, J. F., Shariff, A., & Rahwan, I. (2016).
The social dilemma of autonomous vehicles. *Science*, 352(6293), 1573-1576.

Predicting unknown words in red for senior secondary

Figuring out how to build **ethical**³⁺¹⁸ autonomous machines is one of the **thorniest**⁰⁺⁴ challenges in artificial **intelligence**¹⁴⁺⁵³ today (22). As we are about to **endow**⁰⁺² millions of vehicles with **autonomy**¹⁺⁶, a serious consideration of algorithmic morality has never been more urgent. Our data-driven approach highlights how the field of experimental **ethics**¹⁺⁵ can provide key insights into the moral, cultural, and legal standards that people expect from autonomous driving **algorithms**⁰⁺¹. For the time being, there seems to be no easy way to design **algorithms**⁰⁺¹ that would **reconcile**⁰⁺² moral values and personal self-interest—let alone account for different cultures with various moral attitudes regarding life-life trade-offs (23)—but public opinion and social pressure may very well shift as this conversation progresses.

Predicting unknown words in red for collegiate basic

Figuring out how to build **ethical**³⁺¹⁸ autonomous machines is one of the **thorniest**⁰⁺⁴ challenges in artificial intelligence today (22). As we are about to **endow**⁰⁺² millions of vehicles with **autonomy**¹⁺⁶, a serious consideration of algorithmic morality has never been more urgent. Our data-driven approach highlights how the field of experimental **ethics**¹⁺⁵ can provide key insights into the moral, cultural, and legal standards that people expect from autonomous driving **algorithms**⁰⁺¹. For the time being, there seems to be no easy way to design **algorithms**⁰⁺¹ that would reconcile moral values and personal self-interest—let alone account for different cultures with various moral attitudes regarding life-life trade-offs (23)—but public opinion and social pressure may very well shift as this conversation progresses.

Predicting unknown words in red for collegiate intermediate

Figuring out how to build **ethical**³⁺¹⁸ autonomous machines is one of the thorniest challenges in artificial intelligence today (22). As we are about to endow millions of vehicles with autonomy, a serious consideration of algorithmic morality has never been more urgent. Our data-driven approach highlights how the field of experimental **ethics**¹⁺⁵ can provide key insights into the moral, cultural, and legal standards that people expect from autonomous driving **algorithms**⁰⁺¹. For the time being, there seems to be no easy way to design **algorithms**⁰⁺¹ that would reconcile moral values and personal self-interest—let alone account for different cultures with various moral attitudes regarding life-life trade-offs (23)—but public opinion and social pressure may very well shift as this conversation progresses.

Our Solution

2 Prioritizing Words

We provide the *benchmark frequency* of each unknown word in the benchmark corpus *at the upper right corner* – this information is highly useful in helping to *prioritize and rank* the unknown words in creating a wordlist

Predicting unknown words in red for collegiate basic

Figuring out how to build **ethical**³⁺¹⁸ autonomous machines is one of the **thorniest**⁰⁺⁴ challenges in artificial intelligence today (22). As we are about to **endow**⁰⁺² millions of vehicles with **autonomy**¹⁺⁶, a serious consideration of algorithmic morality has never been more urgent. Our data-driven approach highlights how the field of experimental **ethics**¹⁺⁵ can provide key insights into the moral, cultural, and legal standards that people expect from autonomous driving **algorithms**⁰⁺¹. For the time being, there seems to be no easy way to design **algorithms**⁰⁺¹ that would reconcile moral values and personal self-interest—let alone account for different cultures with various moral attitudes regarding life-life trade-offs (23)—but public opinion and social pressure may very well shift as this conversation progresses.

Please note the upper right corner of the unknown words in red

Our Solution

3 Creating A Wordlist

- based on the ranking, we can easily verify that the **total percentage** of the unknown words included in the wordlist is **smaller than 2%**
- unknown words are provided with **annotations** including Chinese and English explanations, example sentences, synonyms and antonyms, etc.

ethical³⁺¹⁸ autonomous machines is one of the thorniest⁰⁺

查询

替换

1.中文解释:

adj. 伦理学的; 道德的, 伦理的; 凭处方出售的;
n. 凭医师处方出售的药品;

2.英文释义:

Adjective

1. of or relating to the philosophical study of ethics;
2. conforming to accepted standards of social or professional behavior;
3. adhering to ethical and moral principles;

ethical³⁺¹⁸ autonomous machines is one of the thorniest⁰⁺⁴ ct

查询

替换

honorable	高中入门
decent	高中毕业
moral	高中毕业
noble	高中毕业
pure	高中毕业
virtuous	高中毕业
upright	大学一般要求
conscientious	大学较高要求
righteous	大学更高要求
decorous	词表未收录
deontological	词表未收录
2.其他释义	
high-minded	词表未收录

Please note that unknown words are provided with **annotations** including *Chinese and English explanations, example sentences, synonyms and antonyms*, etc.

Project 2
Creating Wordlist

- One paragraph is selected from **Case A**.
- Can you **underline the words** that you think are challenging to most students at the *collegiate basic level* (freshmen or sophomores)?
- Please sort the words you identified by frequency of use, with **high frequency first**.

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Bonnefon, J. F., Shariff, A., & Rahwan, I. (2016).
The social dilemma of autonomous vehicles. *Science*, 352(6293), 1573-1576.



The wordlist automatically created from the paragraph selected from **Case A**

rank	word	benchmark frequency	text frequency	coverage	cumulative coverage	wordlist
1	ethical	21	1	0.86	0.86	off-list
2	autonomy	7	1	0.86	1.72	collegiate intermediate
3	ethics	6	1	0.86	2.59	off-list
4	thorn	4	1	0.86	3.45	collegiate intermediate
5	endow	2	1	0.86	4.31	collegiate intermediate
6	algorithm	1	2	1.72	6.03	off-list

Concept 2 Summary

- Using *lexical profiles*, the unknown words are **predicted** for students at different proficiency levels in the Chinese context
- each unknown word is **prioritized and ranked** based on the benchmark frequency
- the total percentage of the unknown words included in the wordlist is suggested to be **smaller than 2%**

Concept 3
Syntactic Profiles

complexity index
of the text, **Case A**
autonomous vehicles
is at the **collegiate**
intermediate level

Science

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Jean-François Bonnefais¹, Azim Shariff^{2,3}, Iyad Rahwan^{1,4}

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³The Media Lab, Massachusetts Institute of Technology, Cambridge, MA 02139, USA

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When it becomes possible to program decision-making based on moral principles into machines, will self-interest or the public good predominate? In a series of surveys, Bonnefais et al. found that even though participants approve of autonomous vehicles that might sacrifice passengers to save others, respondents would prefer not to ride in such vehicles (see the Perspective by Greene). Respondents would also not approve regulations mandating self-sacrifice, and such regulations would make them less willing to buy an autonomous vehicle.

Abstract

Autonomous vehicles (AVs) should reduce traffic accidents, but they will sometimes have to choose between two evils, such as running over pedestrians or sacrificing themselves and their passenger to save the pedestrians. Defining the algorithms that will help AVs make these moral decisions is a formidable challenge. We found that participants in six Amazon Mechanical Turk studies approved of utilitarian AVs (that is, AVs that sacrifice their passengers for the greater good) and would like others to buy them, but they would themselves prefer to ride in AVs that protect their passengers at all costs. The study participants disapproved of enforcing utilitarian regulations for AVs and would be less willing to buy such an AV. Accordingly, regulating for utilitarian algorithms may paradoxically increase casualties by postponing the adoption of a safer technology.

Case 3

ETHICS

Which kinds of
linguistic adaptation
are needed
if **Case A** is to be
used for **collegiate**
basic level?

Science

The social dilemma of autonomous vehicles

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DOI: 10.1126/science.125054

Codes of conduct in autonomous vehicles

When it becomes possible to program decision-making based on moral principles into machines, will self-interest or the public good predominate? In a series of surveys, Bonnefais et al. found that even though participants approve of autonomous vehicles that might sacrifice passengers to save others, respondents would prefer not to ride in such vehicles (see the Perspective by Greene). Respondents would also not approve regulations mandating self-sacrifice, and such regulations would make them less willing to buy an autonomous vehicle.

Abstract

Autonomous vehicles (AVs) should reduce traffic accidents, but they will sometimes have to choose between two evils, such as running over pedestrians or sacrificing themselves and their passenger to save the pedestrians. Defining the algorithms that will help AVs make these moral decisions is a formidable challenge. We found that participants in six Amazon Mechanical Turk studies approved of utilitarian AVs (that is, AVs that sacrifice their passengers for the greater good) and would like others to buy them, but they would themselves prefer to ride in AVs that protect their passengers at all costs. The study participants disapproved of enforcing utilitarian regulations for AVs and would be less willing to buy such an AV. Accordingly, regulating for utilitarian algorithms may paradoxically increase casualties by postponing the adoption of a safer technology.

Case 3

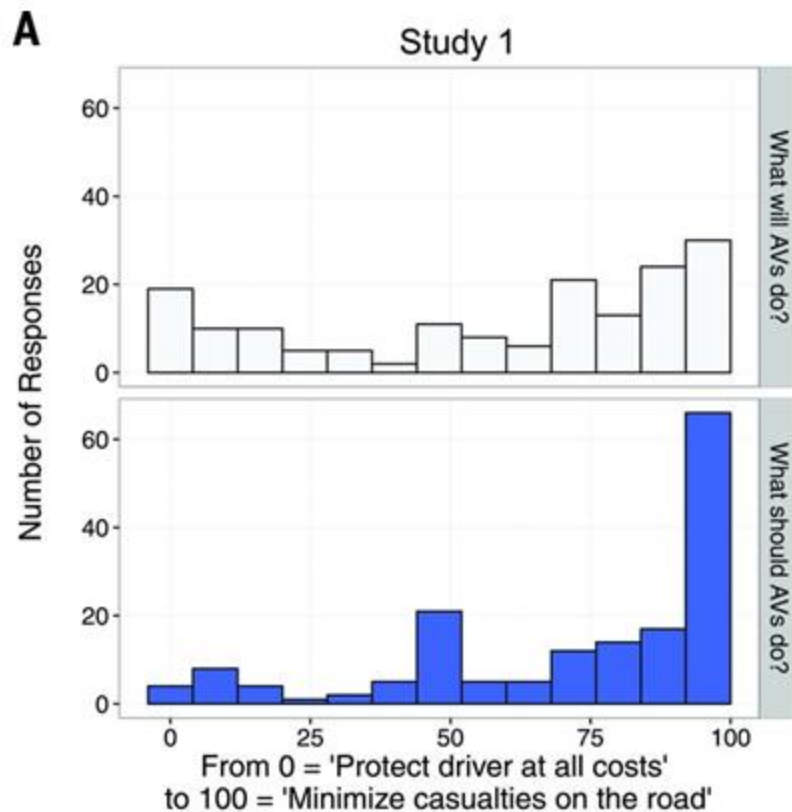
ETHICS

We conducted a **survey**
among teachers and students,
and the second **concern** is ...

college students are not familiar with
the *syntactic structures* employed
in **interpreting data** from **Tables** and **Figures**

Project 3
Analyzing Structure

- One paragraph interpreting Fig. 2A is selected from **Case A**.
- Can you *identify the syntactic structures* that you think are challenging to college students (freshmen or sophomores)?
- Please share with us the structures you've identified, as well as **your reasons** for doing so..



Bonnefon, J. F., Shariff, A., & Rahwan, I. (2016).
The social dilemma of autonomous vehicles. *Science*, 352(6293), 1573-1576.

In study one ($n = 182$ participants), 76% of participants thought that it would be more moral for AVs to sacrifice one passenger rather than kill 10 pedestrians [with a 95% confidence interval (CI) of 69 to 82]. These same participants were later asked to rate which was the most moral way to program AVs, on a scale from 0 (protect the passenger at all costs) to 100 (minimize the number of casualties). They overwhelmingly expressed a moral preference for utilitarian AVs programmed to minimize the number of casualties (median = 85) (**Fig. 2A**). However, participants were less certain that AVs would be programmed in a utilitarian manner (67% thought so, with a median rating of 70). Thus, participants were not worried about AVs being too utilitarian, as often portrayed in science-fiction works. If anything, they imagined future AVs as being less utilitarian than they should be.

Bonnefon, J. F., Shariff, A., & Rahwan, I. (2016).
The social dilemma of autonomous vehicles. *Science*, 352(6293), 1573-1576.

Project 3
Analyzing Structure

One undergraduate student analyzed the *syntactic structures* as below:

1. In study ... (n = ... participants), ... of participants *thought that* it would be more ... for ... to ... rather than ... [*with* a 95 confidence interval (CI) of ... to ...].
2. These ... participants were later asked to rate *which was* the most ... way to ..., on a scale from ... to
3. They overwhelmingly *expressed a ... preference for* ... (Fig. ...).
4. However, participants *were less certain that* ... would be ... in a ... manner (... thought so, with a median rating of ...).
5. Thus, participants were not worried about ... *being* ..., *as often portrayed in* ...

Concept 3

Syntactic Profiles

- syntactic structures of a text are analyzed using **L2 Syntactic Complexity Analyzer** (L2SCA; Lu, 2017)
- To help Chinese EFL teachers analyze syntactic structures, **5 kinds of annotations** are provided: *the longest sentence, dependent clauses, coordinate phrases, complex nominals, non-finite verb phrases*

Lu, X. (2017). Automated measurement of syntactic complexity in corpus-based L2 writing research and implications for writing assessment. *Language Testing*, 34(4), 493-511.

Work in Progress

1 The Longest Sentence

In study one (n = 182 participants), 76 of participants thought that it would be more moral for AVs to sacrifice one passenger rather than kill 10 pedestrians [with a 95 confidence interval (CI) of 69 to 82]. These same participants were later asked to rate which was the most moral way to program AVs, on a scale from 0 (protect the passenger at all costs) to 100 (minimize the number of casualties). They overwhelmingly expressed a moral preference for utilitarian AVs programmed to minimize the number of casualties (median = 85) (Fig. 2A). However,

*Longer sentences generally contain **more information** and are **harder to process**.
The longest sentence in the text is **underlined** so that the teacher may shorten it if necessary.*

2 Dependent Clauses

In study one (n = 182 participants), 76 of participants thought that it would be more moral for AVs to sacrifice one passenger rather than kill 10 pedestrians [with a 95 confidence interval (CI) of 69 to 82]. These same participants were later asked to rate which **was** the most moral way to program AVs, on a scale from 0 (protect the passenger at all costs) to 100 (minimize the number of casualties). They overwhelmingly expressed a moral preference for utilitarian AVs programmed to minimize the number of casualties (median = 85) (Fig. 2A). However, participants were less certain that AVs **would** be programmed in a utilitarian manner (67 thought so, with a median rating of 70). Thus, participants were not worried about AVs being too utilitarian, as often portrayed in science-fiction works. If anything, they imagined future AVs as being less utilitarian than they **should** be.

Subordination constitutes a second dimension of syntactic complexity.

*Here, the first finite verb of each finite dependent clause is highlighted. If necessary, a teacher may **reduce one or more** finite dependent clauses to an independent clause for easier processing.*

3 Coordinate Phrases

In study one (n = 182 participants), 76 of participants thought that it would be more moral for AVs to sacrifice one passenger rather than kill 10 pedestrians [with a 95 confidence interval (CI) of 69 to 82]. These same participants were later asked to rate which was the most moral way to program AVs, on a scale from 0 (protect the passenger at all costs) to 100 (minimize the number of casualties). They overwhelmingly expressed a moral preference for utilitarian AVs programmed to minimize the number of casualties (median = 85) (Fig. 2A). However, participants were less certain that AVs would be programmed in a utilitarian manner (67 thought so, with a median rating of 70). Thus, participants were not worried about AVs being too utilitarian, as often portrayed in science-fiction works. If anything, they imagined future AVs as being less utilitarian than they should be.

*Phrasal coordination constitutes a **third dimension** of syntactic complexity.*

***No coordinate phrase** is found in this text, but had there been one or more coordinate noun, verb, or adjectival phrases, they **would have been highlighted**.*

4 Complex Nominals

In study one (n = 182 **participants**), 76 of **participants** thought that it would be more moral for AVs to sacrifice one **passenger** rather than **kill 10 pedestrians** [with a 95 confidence interval (**CI**) of 69 to 82]. These same **participants** were later asked to **rate** which was the most moral **way** to program AVs, on a **scale** from 0 (protect the **passenger** at all **costs**) to 100 (minimize the **number** of casualties). They overwhelmingly expressed a moral **preference** for utilitarian **AVs** programmed to minimize the **number** of casualties (median = 85) (**Fig. 2A**). However, participants were less certain that AVs would be programmed in a utilitarian **manner** (67 thought so, with a median **rating** of 70). Thus, participants were not worried about **AVs** being too utilitarian, as often portrayed in science-fiction **works**. If anything, they imagined future **AVs** as being less utilitarian than they should be.

*Complex nominals, i.e., noun phrases with one more modifiers, such as an adjective, a post-modifying prepositional phrase, or a relative clause, are **characteristic** of academic writing.*

*At the same time, they may also be **difficult to process**.*

*Here, **the head nouns** of the complex nominals in the texts are highlighted.*

In study one (n = 182 **participants**), 76 of **participants** thought that it would be more moral for AVs to sacrifice one passenger rather than kill 10 pedestrians [with a 95 confidence interval (CI) of 69 to 82]. These same **participants** were later asked to **rate** which was the most moral **way** to program AVs, on a **scale** from 0 (protect the **passenger** at all **costs**) to 100 (minimize the **number** of casualties). They overwhelmingly expressed a moral **preference** for utilitarian **AVs** programmed to minimize the **number** of casualties (median = 85) (Fig. 2A). However, participants were less certain that AVs would be programmed in a utilitarian **manner** (67 thought so, with a median **rating** of 70). Thus, participants were not worried about **AVs** being too utilitarian, as often portrayed in science-fiction **works**. If anything, they imagined future **AVs** as being less utilitarian than they should be.

*Notice that there may be **occasional errors** in the analysis, and automatic identification of **the boundaries** of complex nominals is more error-prone. There, the highlighting serves as **an aid to the teacher in identifying** complex nominals and their boundaries.*

5 Non-finite Verb Phrases

In study one (n = 182 participants), 76 of participants thought that it would be more moral for AVs **to sacrifice** one passenger rather than kill 10 pedestrians [with a 95 confidence interval (CI) of 69 **to** 82]. These same participants were later asked to rate which was the most moral way to program AVs, on a scale from 0 (protect the passenger at all costs) to 100 (minimize the number of casualties). They overwhelmingly expressed a moral preference for utilitarian AVs programmed **to minimize** the number of casualties (median = 85) (Fig. 2A). However, participants were less certain that AVs would be programmed in a utilitarian manner (67 thought so, with a median rating of 70). Thus, participants were not worried about AVs being too utilitarian, as often portrayed in science-fiction works. If anything, they imagined future AVs as **being** less utilitarian than they should be.

*Finally, we also highlight **non-finite verb phrases**, including **infinitives**, **present participle**, and **past participle**.*

Concept 3 Recommendation

- In future work, *syntactic profiles* can be further investigated in order to help teachers analyze the syntactic structures of an academic reading text **more accurately and effectively**
- In addition to wordlists, **a phrasal expressions list** can be created to facilitate the automated analysis of academic reading texts for students at different proficiency levels

using our online **free** tool
for *text adaptation*

Open your browser
Enter
LanguageData.net

*you will get the website
shown on the right*

The screenshot shows the LanguageData website interface. At the top left is the LanguageData logo. The main content area has a green background and features two course cards. The left card is titled '阿權小倪讲量化' (Aquan and Xiani on Quantitative) and includes a bar chart and two cartoon characters. The right card is titled '如何迅速找准量化研究问题' (How to quickly find quantitative research questions) and features a single cartoon character. Above the cards is the text '带着问题学方法' (Learn with questions). Below the cards are three circular icons: a speech bubble for '语言数据与研究课程' (Language Data and Research Course), a pencil for '英语阅读分级指南' (English Reading Level Guide), and a magnifying glass for '汉语阅读分级指南' (Chinese Reading Level Guide). At the bottom, a dark grey footer contains the copyright notice: '© 2014-2018 LanguageData All Rights Reserved. 粤ICP备15030803号-1'.

click on the logo
directly in
the middle below

*You will get access to
our tool for
text adaptation*

LANGUAGE DATA

带着问题学方法

语言、数据与研究 1
阿權小倪 讲 量化

语言、数据与研究系列 微语言课程
如何迅速找准
量化研究问题
主讲专家：金樱

语言数据与研究课程

英语阅读分级指南

汉语阅读分级指南

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英语阅读分级指难针

主持人：金檀、陆小飞、郭凯、李百川

登录

注册

请注册/登录后使用指难针 ([使用手册](#))

研制基础：[词汇缺口](#) (2016) | [句法档案](#) (2017) | [难度调控](#) (2018)

Jin, T., Lu, X., Guo K., & Li, B. (2018). *Eng-Editor: A data-driven tool for English text adaptation*. Guangzhou: LanguageData (languagedata.net/tester).

英语阅读分级指难针

主持人：金檀、陆小飞、郭凯、李百川

If you use it for the first time, please click the *register* button



The image shows a login and registration interface. It features three input fields: the first with a person icon, the second with a lock icon, and the third with a purple 'y' logo. Below the fields are two blue buttons: '登录' (Login) on the left and '注册' (Register) on the right. A large blue arrow points from the left towards the '注册' button.

请注册/登录后使用指难针 ([使用手册](#))

研制基础：[词汇缺口](#) (2016) | [句法档案](#) (2017) | [难度调控](#) (2018)

英语阅读分级指难针

Now you can fill in your
relevant information

Enter *verification code* and
click *register* to log in


*用户名: 请使用邮箱作为用户名

*密码:

*重复密码:

*手机: 支持手机号登录

工作单位: 所在单位名称

验证码: 

注册

Next, you will get this webpage.
Paste the text you want to
analyze into
the *middle box*

Enter *verification code* and
click *start analysis*

The screenshot shows the 'LanguageData' website interface for '英语文本指难针' (English Text Benchmarking). The page includes a title, a subtitle '使用手册' (User Manual), and a list of hosts: '主持人: 金梅, 陆小飞, 郭凯, 李西川'. Below this is a course recommendation: '课程推荐: "语言, 数据与研究" 系列 网址'. The main content area is titled '文章' (Text) and contains two paragraphs of English text about autonomous vehicles. Below the text is a '验证码' (Verification Code) field containing 'XUy4' and a '开始分析' (Start Analysis) button. At the bottom, there is a '引用请注明出处:' (Please cite the source) section with two references: '金梅, 陆小飞, 郭凯, 李西川. (2018). "英语文本指难针". 广州: 语言数据网 (language-data.net/tester). Jin, T., Lu, X., Guo K., & Li, S. (2018). *Eng-Editor: A data-driven tool for English text adaptation*. Guangzhou: LanguageData (language-data.net/tester).

The tool will jump to the *user center*

Wait a few seconds until the *wait* in the operation status bar to change to *view*

Click *view* to see the results

用户中心

位置 > 任务计划

创建时间	开始时间	结束时间	操作
2018-11-21 21:35:20			等待
Good Morning Britain's Susanna Reid is used to grilling guests o...			
2018-11-21 08:33:47	2018-11-21 08:33:50	2018-11-21 08:33:59	查看
Good Morning Britain's Susanna Reid is used to grilling guests d...			
2018-11-19 11:19:09	2018-11-19 11:19:14	2018-11-19 11:19:22	查看
Principal, teachers and fellow students. Good...			
2018-11-19 11:15:27	2018-11-19 11:15:29	2018-11-19 11:15:34	查看
The way to guarante...			
2018-11-19 11:09:23	2018-11-19 11:13:33	2018-11-19 11:13:44	查看
...morning paper you find an entry form for a lucky draw sp...			
2018-11-19 11:09:21	2018-11-19 11:09:23	2018-11-19 11:09:33	查看
Good Morning Britain's Susanna Reid is used to grilling guests o...			
2018-11-18 20:22:23	2018-11-18 20:22:24	2018-11-18 20:22:32	查看
You probably know about the Titanic, but it was actually just on...			
2018-11-18 20:21:54	2018-11-18 20:22:01	2018-11-18 20:22:09	查看
You probably know about the Titanic, but it was actually just on...			

共1页 1 go

说明: 分析结果保留一段时间。

Now you will get the webpage of *lexical profiles*



词汇分析

超纲词汇分析

小学入门	初中毕业	高中入门	高中毕业	大学一般要求	大学较高要求	大学更高要求
50.74%	24.21%	18.56%	12.44%	8.18%	4.60%	4.05%

The year 2007 saw the completion of the first **benchmark**^{[1][2]} test for autonomous driving in realistic urban environments (1, 2). Since then, autonomous vehicles (AVs) such as Google's self-driving car covered thousands of miles of real-road driving (3). AVs have the potential to benefit the world by increasing traffic efficiency (4), reducing pollution (5), and eliminating up to 90% of traffic accidents (6). Not all crashes will be avoided, though, and some crashes will require AVs to make difficult **ethical**^{[1][8]} decisions in cases that involve unavoidable harm (7). For example, the **AV**^[1] may avoid harming several pedestrians by **swerving**^{[1][9]} and sacrificing a passerby, or the **AV**^[1] may be faced with the choice of sacrificing its own passenger to save one or more pedestrians (Fig. 1). Although these scenarios appear unlikely, even low-probability events are bound to occur with millions of AVs on the road.

Moreover, even if these situations were never to arise, **AV**^[1] programming must still include decision rules about what to do in such **hypothetical**^[1] situations. Thus, these types of decisions need to be made well before AVs become a global commodity. Distributing harm is a decision that is universally considered to fall within the moral domain (8, 9). Accordingly, the **algorithms**^[1] that control AVs will need to embed moral principles guiding their decisions in situations of unavoidable harm (10). Manufacturers and regulators will need to accomplish three potentially incompatible objectives: being consistent, not causing public outrage, and not discouraging buyers. However, pursuing these objectives may lead to moral inconsistencies.

Consider, for example, the case displayed in Fig. 1A, and assume that the most common moral attitude is that the **AV**^[1] should **swerve**^{[1][9]}. This would fit a **utilitarian**^{[1][5]} moral doctrine (11), according to which the moral course of action is to minimize casualties. But consider then the case displayed in Fig. 1C. The **utilitarian**^{[1][5]} course of action, in that situation, would be for the **AV**^[1] to **swerve**^{[1][9]} and kill its passenger, but AVs programmed to follow this course of action might discourage buyers who believe their own safety should **trump**^{[1][2]} other considerations. Even though such situations may be exceedingly rare, their emotional saliency is likely to give them broad public exposure and a **disproportionate**^{[1][10]} weight in individual and public decisions about AVs. To **align**^{[1][2]} moral **algorithms**^[1] with human values, we must start a collective discussion about the **ethics**^{[1][5]} of AVs—that is, the moral **algorithms**^[1] that we are willing to accept as citizens and to be **subjected**^{[1][10]} to as car owners. Thus, we initiate the data-driven study of driverless car **ethics**^{[1][5]}, inspired by the methods of experimental **ethics**^{[1][5]} (12). We conducted six online surveys (n = 1928 total participants) between June and November 2015.

You can
select a wordlist
of one proficiency level
in the Chinese context
for predicting
unknown words in red



词汇分析

翻译词汇分析



The year 2007 saw the completion of the first **benchmark**^[2] test for autonomous driving in realistic urban environments (1, 2). Since then, autonomous vehicles (AVs) such as Google's self-driving car covered thousands of miles of real-road driving (3). AVs have the potential to benefit the world by increasing traffic efficiency (4), reducing pollution (5), and eliminating up to 90% of traffic accidents (6). Not all crashes will be avoided, though, and some crashes will require AVs to make difficult **ethical**^[18] decisions in cases that involve unavoidable harm (7). For example, the AV^[1] may avoid harming several pedestrians by **swerving**^[10] and sacrificing a passenger, or the AV^[1] may be faced with the choice of sacrificing its own passenger to save one or more pedestrians (Fig. 1). Although these scenarios appear unlikely, even low-probability events are bound to occur with millions of AVs on the road.

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Predicting unknown words in red for collegiate basic

Figuring out how to build **ethical**³⁺¹⁸ autonomous machines is one of the **thorniest**⁰⁺⁴ challenges in artificial intelligence today (22). As we are about to **endow**⁰⁺² millions of vehicles with **autonomy**¹⁺⁶, a serious consideration of algorithmic morality has never been more urgent. Our data-driven approach highlights how the field of experimental **ethics**¹⁺⁵ can provide key insights into the moral, cultural, and legal standards that people expect from autonomous driving **algorithms**⁰⁺¹. For the time being, there seems to be no easy way to design **algorithms**⁰⁺¹ that would reconcile moral values and personal self-interest—let alone account for different cultures with various moral attitudes regarding life-life trade-offs (23)—but public opinion and social pressure may very well shift as this conversation progresses.

Please note the upper right corner of the unknown words in red

ethical³⁺¹⁸ autonomous machines is one of the thorniest⁰⁺

查询

替换

1.中文解释:

adj. 伦理学的; 道德的, 伦理的; 凭处方出售的;
n. 凭医师处方出售的药品;

2.英文释义:

Adjective

1. of or relating to the philosophical study of ethics;
2. conforming to accepted standards of social or professional behavior;
3. adhering to ethical and moral principles;

ethical³⁺¹⁸ autonomous machines is one of the thorniest⁰⁺⁴ ct

查询

替换

honorable	高中入门
decent	高中毕业
moral	高中毕业
noble	高中毕业
pure	高中毕业
virtuous	高中毕业
upright	大学一般要求
conscientious	大学较高要求
righteous	大学更高要求
decorous	词表未收录
deontological	词表未收录
2.其他释义	
high-minded	词表未收录

left click on the word in red will get the **annotations** automatically including *Chinese and English explanations, example sentences, synonyms and antonyms*, etc.

Click to get the new *wordlist* you created

Click *next* to enter the webpage for *syntactic profiles*



生成词表

大纲词汇

!用“查询”和“替换”功能;

!表示该词在“阅读基准数据库”的教材语料中出现的频次，蓝色数字表示该词在“阅读基准数据库”的

!取超纲词表，包括排序、单词、基准频次、教材频次、试题频次、文中频次、覆盖率、累积覆盖率和等



上一步

下一步

!按覆盖率并生成大纲词表。

Now you arrive at the webpage
of *syntactic profiles*

Click *next* for the webpage of
complexity indices

句法分析

从属子句和复杂句语标注

*独立性从属子句 ◯并列短语 ◯复杂名词短语 ◯非限定性定语短语

107 31 305 104

The year 2007 saw the completion of the first benchmark test for autonomous driving in realistic urban environments (1, 2). Since then, autonomous vehicles (AVs) such as Google's self-driving car covered thousands of miles of real-road driving (3). AVs have the potential to benefit the world by increasing traffic efficiency (4), reducing pollution (5), and eliminating up to 90% of traffic accidents (6). Not all crashes will be avoided, though, and some crashes will require AVs to make difficult ethical decisions in cases that involve unavoidable harm (7). For example, the AV may avoid harming several pedestrians by swerving and sacrificing a passenger, or the AV may be faced with the choice of sacrificing its own passenger to save one or more pedestrians (Fig. 1). Although these scenarios appear unlikely, even low-probability events are bound to occur with millions of AVs on the road.

Moreover, even if these situations *will* never arise, AV programming must still include decision rules about what to do in such hypothetical situations. Thus, these types of decisions need to be made well before AVs become a global commodity. Distributing harm is a decision that is universally considered to fall within the moral domain (8, 9). Accordingly, the algorithms that control AVs will need to embed moral principles guiding their decisions in situations of unavoidable harm (10). Manufacturers and regulators will need to accomplish three potentially incompatible objectives: being consistent, not causing public outrage, and not discouraging buyers. However, pursuing these objectives may lead to moral inconsistencies.

本文共计2371词，最长句子64词

注：

1. “独立性从属子句”包括定语从句、状语从句和宾语从句等；“并列短语”包括由并列连词连接的形容词、副词、名词和动词短语等；“复杂名词短语”包括含有定语、形容词、介词短语、定语从句、现在分词或过去分词修饰的名词短语；“非限定性定语短语”包括定语从句、动名词短语和过去分词短语等。

2. 分析结果仅供参考，不作为法律依据，仅供参考和提示，用户可根据提示自行调整子句或短语。

3. 上页已标注。

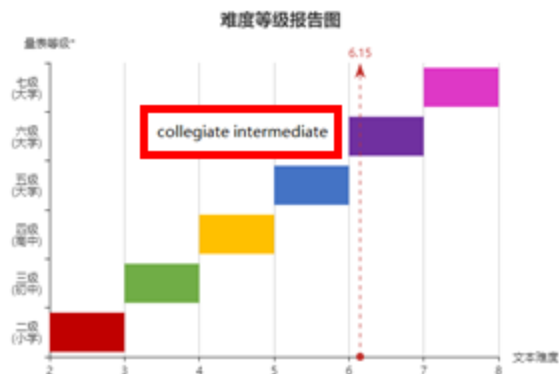
4. 分析结果可能存在少量误差，请人工核对。

上一步

下一步

Finally, you will arrive
at the webpage of
complexity indices

英语阅读分级指难针



*参照《中国英语能力等级量表》(2018)

难度指标报告表

类别	量化指标	对应等级
词汇难度	7.46	七级 (大学)
句法难度	4.30	四级 (高中)
文本难度	6.15	六级 (大学)

引用请注明出处:

金楦, 陆小飞, 郭凯, 李西川. (2018). "英语阅读分级指难针". 广州: 语言数据网 (languagedata.net/tester).

Jin, T., Lu, X., Guo, K., & Li, B. (2018). *Eng-Editor: An online English text evaluation and adaptation system*. Guangzhou: LanguageData (languagedata.net/tester).

The social dilemma of autonomous vehicles

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Case A *Autonomous Vehicles*

[Article](#)[Figures & Data](#)[Info & Metrics](#)[eLetters](#)[PDF](#)

Codes of conduct in autonomous vehicles

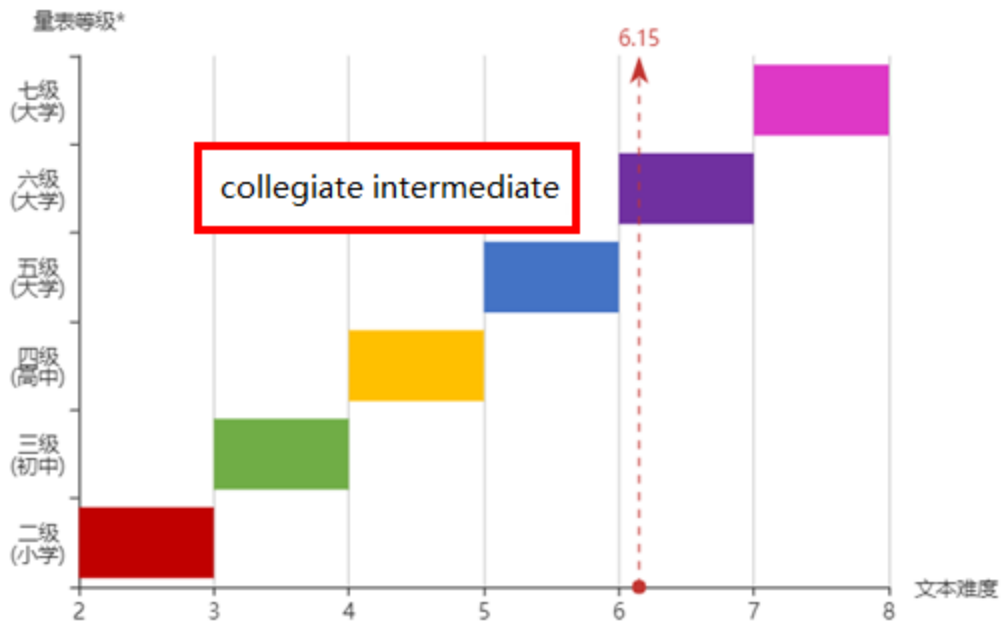
When it becomes possible to program decision-making based on moral principles into machines, will self-interest or the public good predominate? In a series of surveys, Bonnefon *et al.* found that even though participants approve of autonomous vehicles that might sacrifice passengers to save others, respondents would prefer not to ride in such vehicles (see the Perspective by Greene). Respondents would also not approve regulations mandating self-sacrifice, and such regulations would make them less willing to buy an autonomous vehicle.

Science, this issue p. **1573**; see also p. **1514**

英语阅读分级指难针



难度等级报告图



*参照《中国英语能力等级量表》(2018)

for *more details*,
please visit our
Online Guidelines



Outline

Part I text complexity

Concept 1 *Complexity Indices*

Part II linguistic adaptation

Concept 2 *Lexical Profiles*

Concept 3 *Syntactic Profiles*

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