

Critical Communication

Clear, Careful, and Creative Thinking for Science

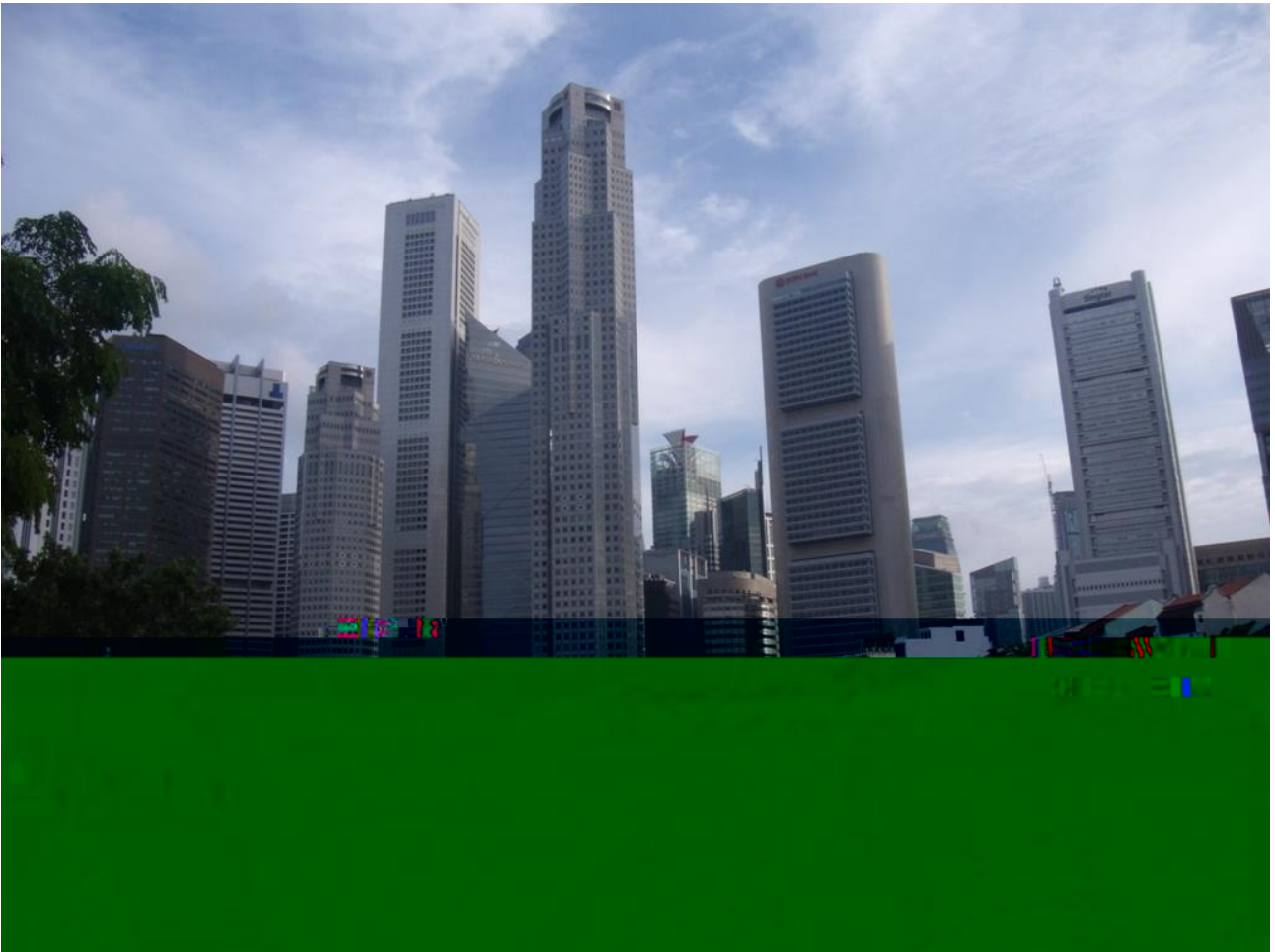
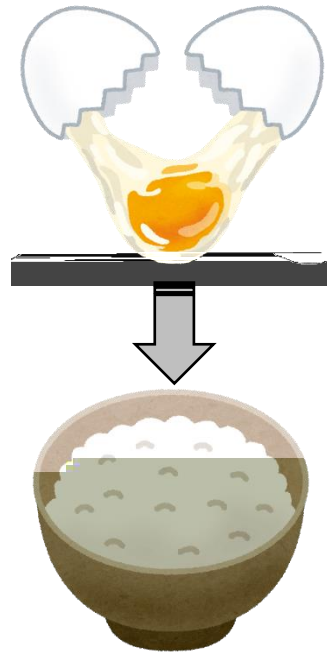
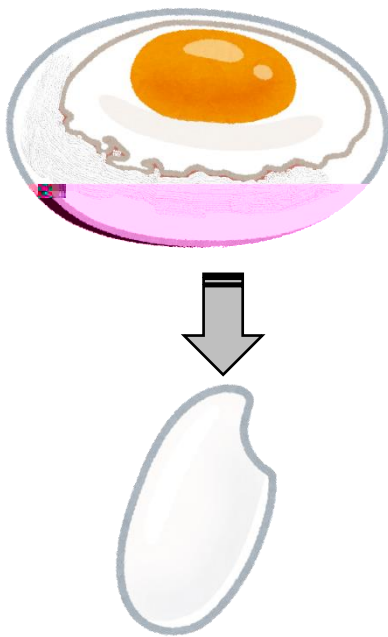
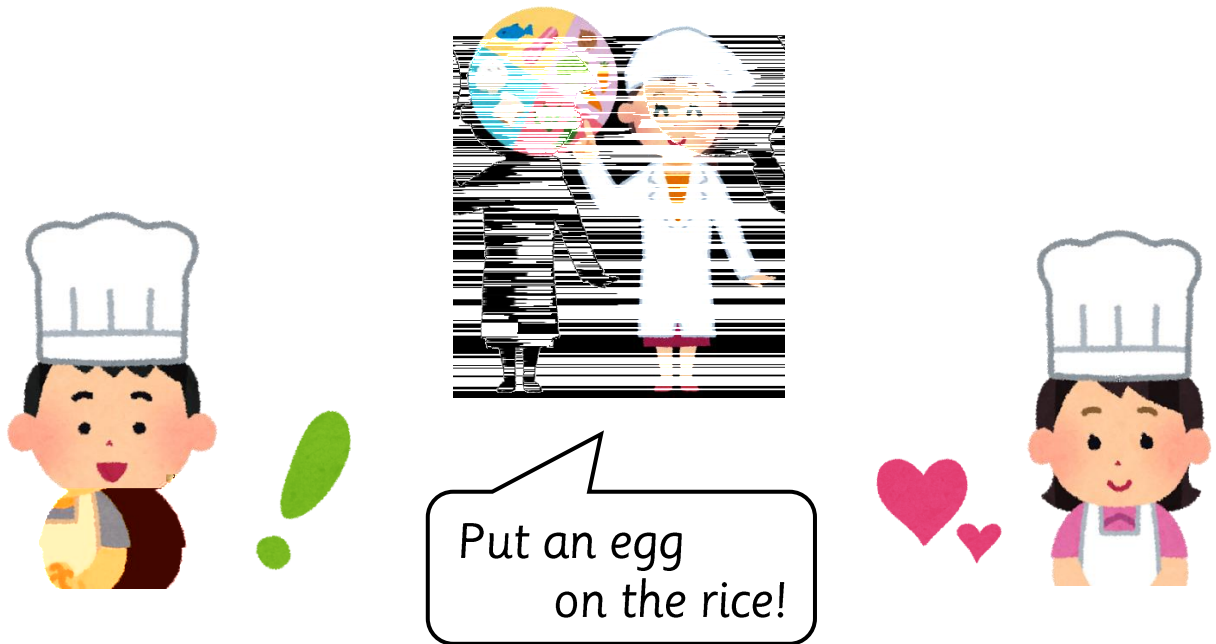


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Chapter 1 How to Make Yourself Understood

1. Who is to blame?



<https://www.irasutoya.com/>

2. What is the problem?

3. “Product Liability” and “Customer Perspective” in Scientific Communication

Question 1: What is missing in these arguments? (Product Liability)

Question 2: How would these arguments look to the readers? (Customer Perspective)

[Sample Argument 1]

Some argue that extraterrestrial beings, or aliens, exist in outer space. I doubt that. If aliens really exist, they should have visited our earth with their “unearthly” technology. At least they should have made contact with us. However, there has never been such a visit or contact so far. Therefore we must say there are no such things as extraterrestrial beings.

[Sample Argument 2]

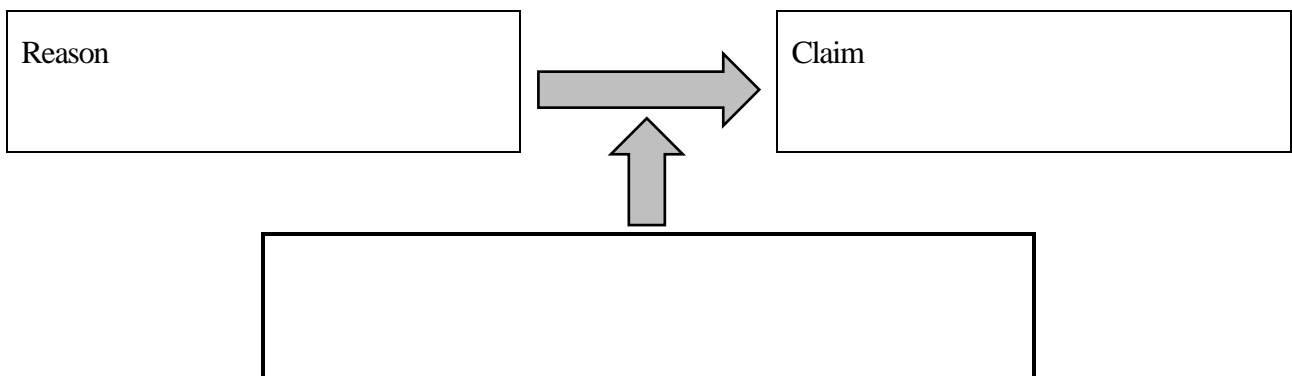
The consumption tax rate should be raised. The government needs money to put its good policies into practice, and the increased revenue from the consumption tax can be used to boost their implementation. Besides, those countries where the consumption tax rates are high are active in their economy. Higher rates lead to a better economy. There is nothing negative in raising the consumption tax rate.

Chapter 2 Deduction

1. The Missing Link

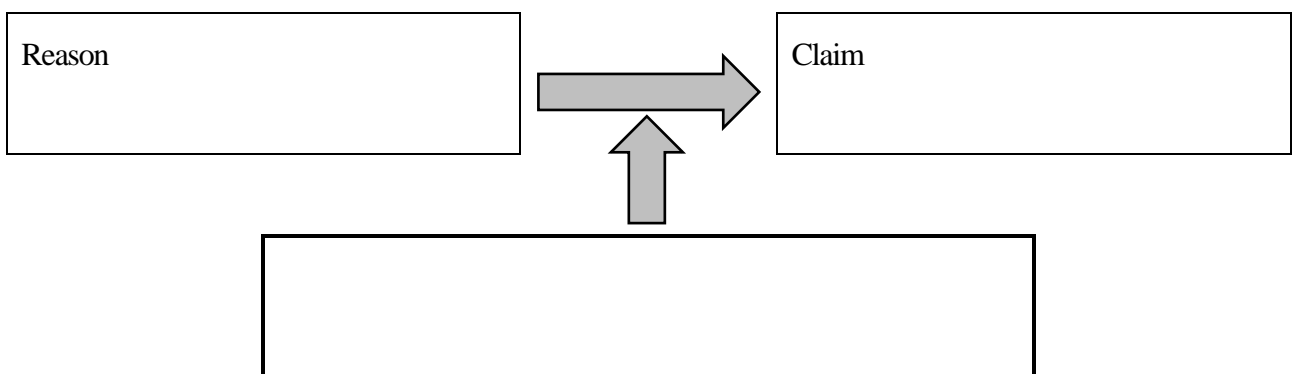
[Sample Argument 1]

Miyajima island is a popular tourist spot. When you come to Japan, you should visit it.



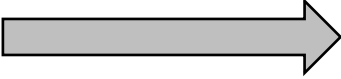
[Sample Argument 2]

I'm visiting Hiroshima next month. But I will not go to Miyajima island because it is a popular tourist spot.




2. Syllogism

	English changes.	
	English is a language.	
	All languages change.	


[Sample Argument 3]

All students should learn English because it is a global language.

[Sample Argument 4]

You should take this medicine because it helps you to stay healthy.

[Sample Argument 5]

Birds fly. And penguins are birds. So, penguins fly.

Chapter 3 Induction

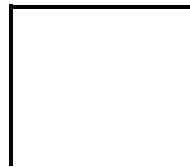
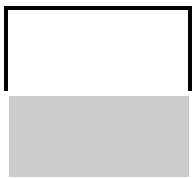
Generalization and Overgeneralization

[Sample Argument 1]

A swallow has wings. A crow has wings. A pigeon has wings. A duck has wings. An ostrich has wings. So, it seems that all birds have wings.

[Sample Argument 2]

A tennis court has a net. A volleyball court has a net. A table-tennis table has a net. A badminton court has a net. So, it seems that all sports use nets.



[Sample Argument 3]

Takeshi, a student at Sora High School, speaks English well. Kyoko, another student at Sora High School, speaks English well, too. Megumi, still another student at Sora High school, speaks English well. The students at Sora High School seem to be good at English.

[Sample Argument 4]

The students at Kita High School study for three hours every day. Those at Higashi High School also study for three hours every day. Those at Nishi High School also study for three hours every day. Therefore, we, the students at Minami High School, should study for three hours every day.

Question: Are Sample Arguments 3 and 4 persuasive? Why? / Why not?

How can they be improved?

Chapter 4 Cause and Effect

1. Untangling the Complex Relationship

[Sample Argument 1]

Hoshi-Machi is a small town in western Japan. The town has been struggling with the declining population and weakening economy.

The new mayor ordered a team of town officials to suggest a plan to revitalize the town. The team worked very hard and found that the population and economy of an area correlated with the number of apartments. The more apartments there were in the area, the larger population and the more vibrant economy it had. Based on this finding, they wrote a report and brought it to the mayor.

The mayor read the report and said, "Thank you very much for your hard work. This report is great. Now, I will start a new policy. We will build more apartment houses in the town. This is a rural area and most people live in independent houses. If we build more apartment houses and encourage people to live there, the population will increase and the

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[Sample Argument 2]

I want to study astronomy at Star University. It is one of the best universities in this country and it is a leading institute in the field of astronomy. But my test scores show I have little chance to pass the entrance exam.

The other day, I had an opportunity to hear several students at Star University speak about how they spent their high school days and studied to enter the university. They all said that they had put their energy not only into studying but also into sports and cultural activities. They also said their strong interest in astronomy and firm determination to enter Star University had helped them to survive the hard days. They all assured that where there is a will, there is a way.

Their advice was quite encouraging. I am already determined to study at Star University and my love of astronomy is second to none. So, from now, I will devote more time to my soccer practice just as those students did. Then, I will be able to pass the exam and study at Star University.

3. Specifying Covariation

Five Methods of Experimental Inquiry	
Method of Agreement	e.g.) →
Method of Difference	e.g.) →
Joint Method of Agreement and Difference	e.g.) →
Method of Residues	e.g.) →
Method of Concomitant Variation	e.g.) →

Chapter 5 Definition

MECE: Mutually Exclusive and Collectively Exhaustive

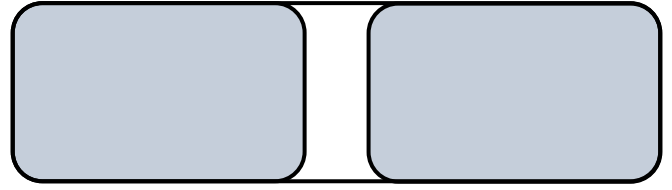
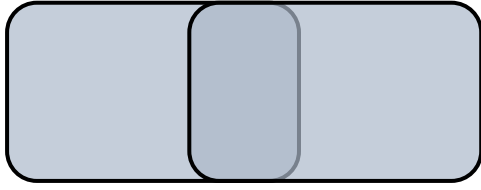
[Sample Argument]

Books can be classified into two categories: books for studying and books for having fun. A typical example of the former is a textbook. It is full of information for you to learn. Books about special technical topics such as science or history are also in this category. The latter includes novels and comic books. There is not much to learn in them, but they entertain you.

Different categorizations can also be made. For example, there are books that communicate mainly through language and books that communicate mainly through pictures. The former is for adults and the latter is for children.

Question: Are these classifications reasonable?

MECE: Mutually Exclusive and Collectively Exhaustive



Chapter 6 Putting Them into a Story

IKPOLET

INTRODUCTION	Interest	
	Knowledge	
	Purpose	
BODY	Outline	
	Link	
	Embodiment, Example, Evidence	
CONCLUSION	Transfer	

Question: What will YOUR story be?

INTRODUCTION	Interest	
	Knowledge	
	Purpose	
BODY	Outline	
	Link	
	Embodiment, Example, Evidence	
CONCLUSION	Transfer	

Appendix 1 Expressions for Presentation

Introduction

We are interested in...

The purpose of this presentation is...

Today, the topic of our presentation is...

We will divide the discussion into three parts. First,... Second,... Finally,...

Let us begin our talk by giving you an explanation of...

To start with, we will provide background information on...

We would like to comment on the problem of...

We would like to briefly mention (that)...

There are two points we would like to make.

We'll show you the data later.

How can we explain...?

Is there a link between...?

Is there a solution to...?

Next, we will demonstrate...

After that, we will take a look at...

We'll give you more information about this in the next section.

Generally speaking,...

Body

So far, we have reviewed....

Let us now turn to...

Let's move on to the next point.

This leads us to another question of...

To illustrate this point, let's consider...

This apparatus consists of...

We'd like to define the term X. X refers to... / X can be defined as...

We'd like to show you the experimental set up we used.

These results show...

On the one hand, I would say..., but on the other hand,...

In spite of..., we should remember...

Despite the fact that...

Although... we still think... because...

What do these results tell us about...?

What can we conclude from these results?

What do we mean by X?

What is the experimental set up?

First of all,...

To begin with,...

At the outset,...

In addition,...

As well as..., there is also...

Moreover...

For example,...

It seems to us...

We have to say...

As far as we are concerned...

To put it simply...

Conclusion

In conclusion, we have made the following points. Number one... Number two...
In closing, we'd like to mention that...
In conclusion, we would like to say...
We'd like to go over our major findings.
We'd like to summarize the main findings of this study.
The main findings of this study are as follows.
As you can see, there are three main points.
In this study, we found that...
Our future work will be to...
We plan to look at...
The next stage in this research is to...
Our future goal is to...
That's we all have to say. Thank you for your attention.
That concludes our presentation. Thank you.
That covers everything we want to say. Thank you.
On the whole,...

Q & A (disagreeing)

I agree in principle, but...
You have a point there, but...
I can see your point of view, but...
I see what you mean, but...
That may be true, but...
I agree with you on the whole, but...
I respect your opinion, but...

but...+
it could also be said that...
we should still think... because...
that is only one of the many contributing factors
that is much too simplified.
our data tell us the opposite

I'm afraid...

Q & A (unable to give an appropriate answer)

At present we don't have enough data to answer that question, but generally speaking...
I'm afraid we can't give you a definite answer, but my speculation is that...
I'm sorry, but that is outside the area of this study.
I'm sorry, but we did not look at that point.
I'm afraid that requires a careful discussion. We do not have enough time to discuss it now. Could we talk later?

Appendix 2 Nouns for Science

(1)	number	(26)	proportion
(2)	integer	(27)	ratio
(3)	even number	(28)	fraction
(4)	odd number / uneven number	(29)	scale
(5)	decimal / decimal fraction	(30)	
(6)	decimal point		
(7)	the first decimal point		
(8)	fraction		
(9)	numerator		
(10)	denominator		
(11)	trisection (trisect)		
(12)	formula / numerical expression		
(13)	average		
(14)	total / sum		
(15)	seven or more (less)		
(16)	round off		
(17)	round up (down)		
(18)	square		
(19)	cube		
(20)	10^{13} ten to the (power of) thirteen / ten to the thirteenth power		
(21)	multiplicator / multiplier		
(22)	absolute value		
(23)	unit		
(24)	weight		
(25)	length		

- (51) diagonal line
- (52) base
- (53) height
- (54) radius
- (55) diameter
- (56) center
- (57) circumference
- (58) pi
- (59)

Appendix 3 Verbs for Science

- (1) absorb carbohydrate
- (2) accelerate a particle to light speed
- (3) accumulate Greenhouse gases in the atmosphere.
- (4) adapt to the climate change
- (5) add the compound to the solution
- (6) adsorb control rods atomic particles
- (7) alternate walking and running
- (8) amount The total loss about 35% 35
- (9) analyze the relationship
- (10) apply a force perpendicular to...
- (11) assemble the apparatus
- (12) assess the intensity
domans an` animals
- (13) assimilate carbon dioxide/ Ê % track

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e disease is

- (28) compare your results
- (29) comply with safety regulations
- (30) compose Water is of hydrogen and oxygen.
- (31) compress files
- (32) conceive Sleep deprivation can decrease the possibility to .
- (33) concentrate The lenses sunlight.
- (34) condense Water vapor into tiny drops.
- (35) condition rats to press the button
- (36) conduct an experiment e 6 n0
- (37) consist The experiment of three stages.
- (38) constitute Lime and sand mortar.

- (56) differ the results
- (57) dilute the solution
- (58) discharge The human body waste.
- (59) discover the relationship
- (60) disinfect water with ultraviolet light [UV rays]
- (61) display your findings
- (62) dissolve in acid
- (63) distort the image
- (64) distribute The samples evenly.
- (65) diversify your experiment locations
- (66) document Its negative influence is well .
- (67) drain water from the container
- (68) drive The machine is by water power.
- (69) elevate the body temperature
- (70) ease muscle tension
- (71) emit greenhouse gases light- diode = LED
- (72) employ a new method in the experiment
- (73) engage The two gears .
- (74) engineer genetically bacteria
- (75) equal Two to the power of five 32.
- (76) evaporate Heat water.
- (77) evolve Small dinosaurs into birds.
- (78) exhale carbon monoxide
- (79) exhibit initial symptoms of a hear attack
- (80) expand The universe is .
- (81) experiment on human subjects
- (82) explode The chemicals exploded.
- (83) explore for methane hydrate

- (112) measure the speed
- (113) melt Ice into water.
- (114) mitigate air pollution
- (115) modify genetically crops
- (116) number each cell from 1 to 15
- (117) neutralize alkali [acid]
- (118) observe the phenomenon
- (119) obtain energy from food
- (120) operate The device on battery power.
- (121) plot temperature on the y-axis
- (122) position Global System (GPS)
- (123) power the motor
- (124) precipitate in the solution
- (125) protect the surface from drying
- (126) provide the cell with energy
- (127) range in height from 10cm to 120cm 10cm 120cm
- (128) react Oxygen and hydrogen with each other.
- (129) reduce nitrates to nitrites
- (130) refer to Table 2 for details.
- (131) refine crude oil
- (132) reflect The sunlight off the white sand.
- (133) regulate body temperature
- (134) release heat into the atmosphere
- (135) renew The tropical rainforest cannot itself.
- (136) repel dirt
- (137) replenish lost water
- (138) resist corrosion
- (139) resolve Water is into oxygen and hydrogen.

- (140) respond to stimulation
- (141) result in a complication
- (142) retrieve information from the Internet
- (143) reverse The Earth's magnetic field has a number of times.
- (144) revise downward
- (145) seal a lead- container
- (146) sense the change in the Earth's magnetic field
- (147) serve as a catalyst
- (148) signal the end of processing
- (149) simplify the design
- (150) specify all the factors
- (151) steady the panel
- (152) steam the cloth to remove stains
- (153) stimulate an immune response
- (154) strain the soup
- (155) stream The liquid down.
- (156) structure a T sign interview
- (157) survey global enm

Swatridge, Colin. 2014. Oxford Guide to Effective Argument and Critical Thinking. Oxford University Press.

2018

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2004

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Matthew Rooks 2018

