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# Critical Thinking as Collective Inquiry

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# What is Critical Thinking?

- Every human being thinks, and wants to think in a good way. Indeed, however, there are many obstacles to good thinking.
- Human thinking is often distorted, biased, partial, and uninformed.
- For the purposes of this lecture, critical thinking is simply good or productive thinking.

# High School & College Education

- High School: (mostly) authority-based learning

- The materials taught at high school are very very sure. The truth of them has been established by strong evidence that many scholars and scientists gather over time. (Meiland, 1981, ch. 2)

# High School & College Education

- College: (ultimately) inquiry-based learning

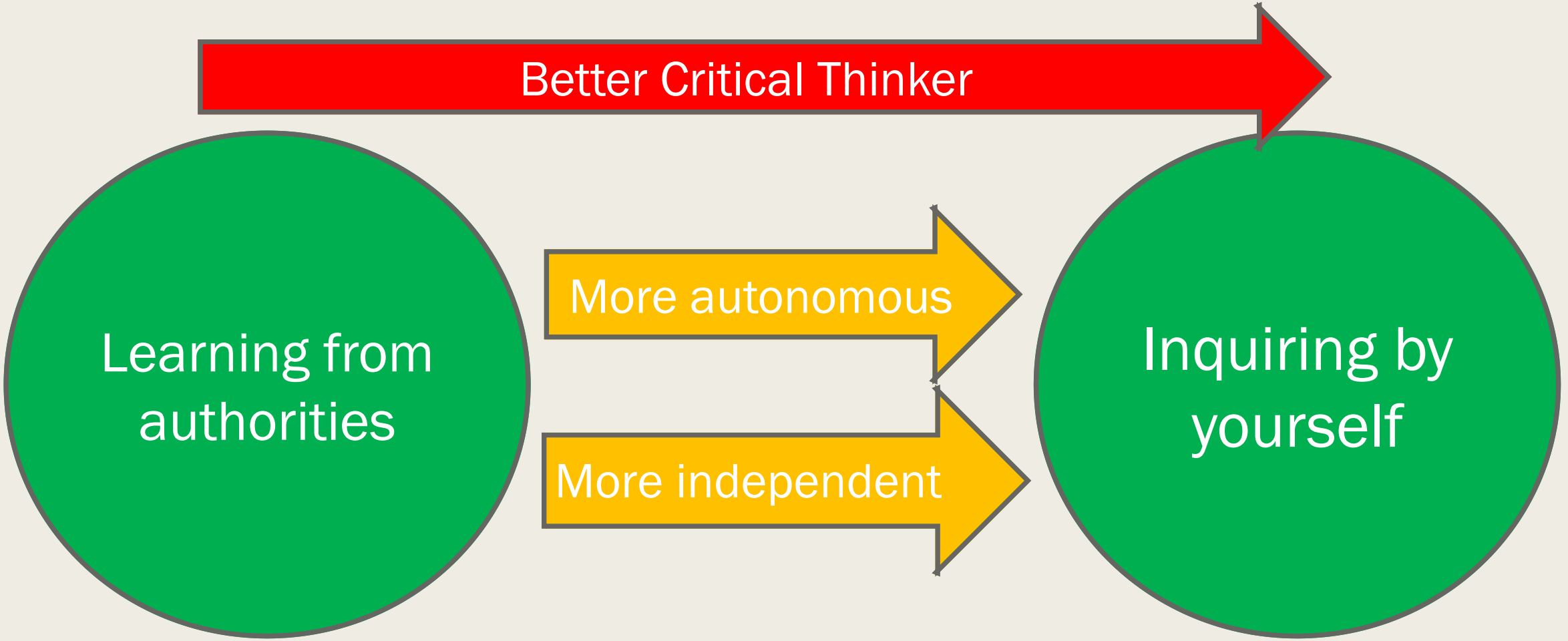
- Materials taught at college are often controversial. The truth of them has not yet been established.
- In addition, you may want to work on a problem that only a few people study. You have to inquire the problem, check the truth of the relevant materials and information, and find a solution to the problem all by yourself.

# High School & College Education

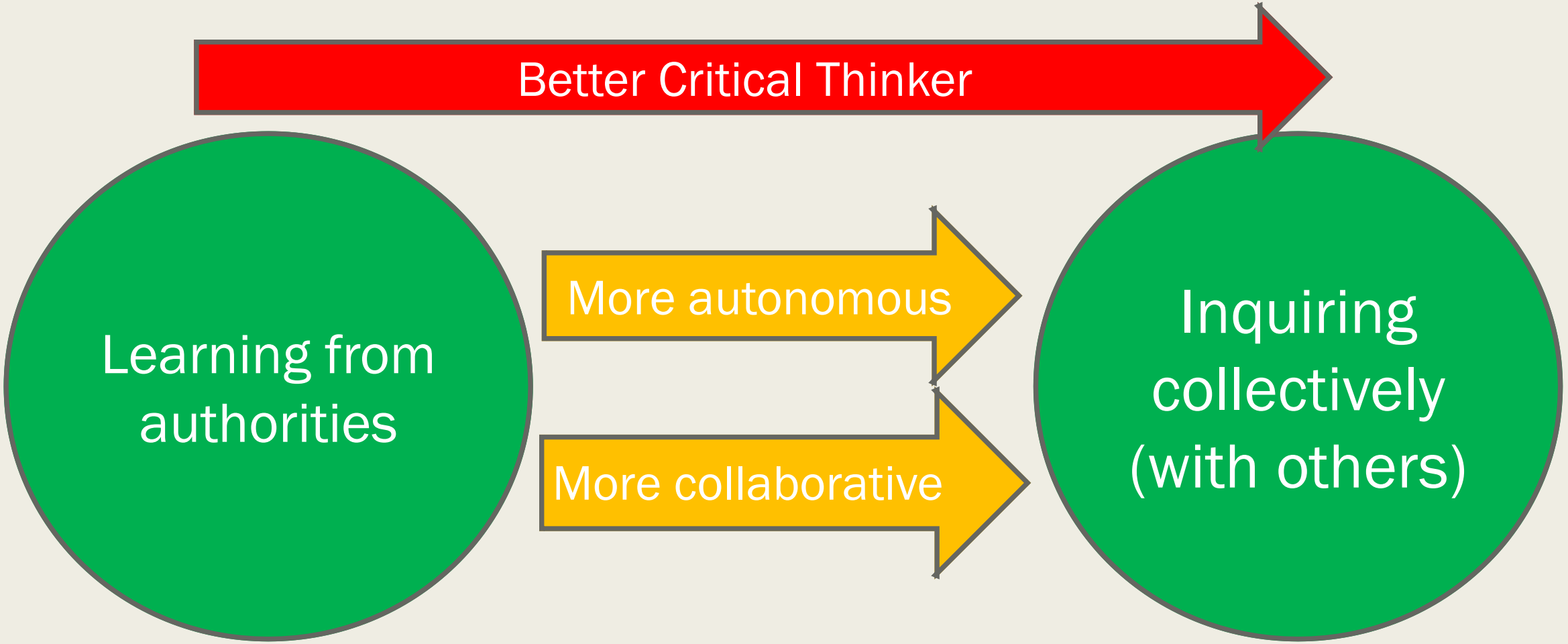
- Inquiry requires thinking at all the stages. For this reason, education at college emphasizes critical thinking.

- However, the traditional way of teaching and learning critical thinking puts too much emphasis on the importance of becoming an independent and autonomous thinker. I think that this is problematic.

# Traditional Learning Model



# Non-Traditional Learning Model



# Reasons against the traditional model

1. Many problems are complex.
2. Human individuals are subject to biases.
3. Logic is different from reasoning.

# Complex Problems (Page, 2017)

- In 2006, Netflix announced an open competition to produce a better program for predicting customers' movie ratings than Netflix's own program.

> "Then there was a great insight among some of the teams — that if they combined their approaches, they actually got better. It was fairly unintuitive to many people [because you generally take the smartest two people and say 'come up with a solution']... when you get this combining of these algorithms in certain ways, it started out this 'second frenzy.' In combination, the teams could get better and better and better."
>
> Van Buskirk (2009) "How the Netflix Prize Was Won"

# Wisdom of Crowds

- In 1907, Francis Galton found that although individual persons were not so good at guessing the weight of an ox, the average of the weights they guessed were more or less accurate.
- Not individuals but the community of individuals has good ability to produce knowledge. This phenomenon is known as the “wisdom of crowds.”

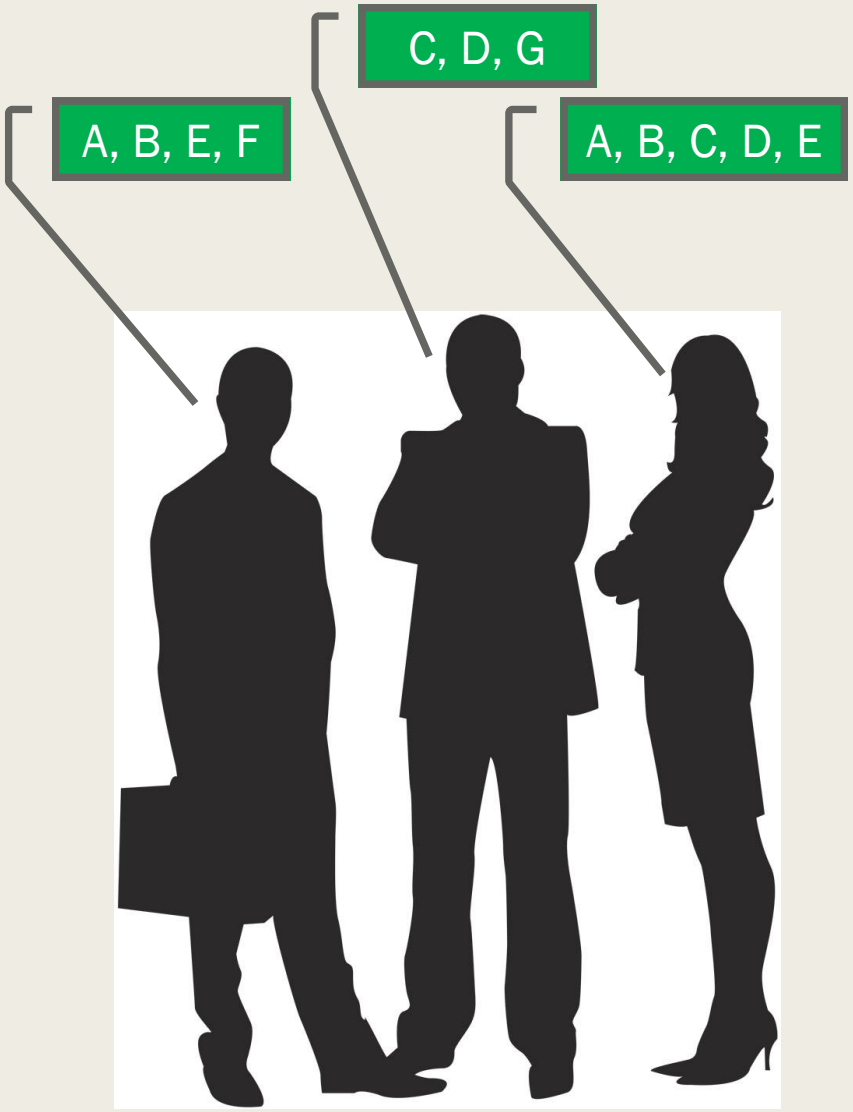
http://1kara.tulip-k.jp/buddhastory/2017011580.html 2018/06/19

# Complex Problems (Page, 2017)

- Scientific, social, political and business problems today are very complex, and often decomposable into tiny bits.

- For such problems, cognitive diversity tends to boost up outcomes while they do not reduce risk.

# Complex Problems (Page, 2017)




https://www.vexels.com/png-svg/preview/131590/office-collegues-meeting-silhouette 2018/06/19

Total Number = {A, A, B, B, C, C, D, D, E, E, F, G}
Kind = {A, B, C, D, E, F, G}

- The cognitive abilities a person has are limited in number and kind.
- When the problem or task at hand is complex, different kinds of cognitive abilities the team has, rather than the total number of them, produce advantages and better outcomes.
- Social diversity is one way to raise cognitive diversity.

# Cognitive Biases

- Confirmation Bias: The tendency to seek information that favors existing beliefs and avoid information that disfavors them.
- Inside-the-Box Bias: The tendency to uncritically accept what is inherited in culture.
- Groupthink: Avoidance of critically examining and objecting to the consensus of the group.

(for more biases, see Travis & Aronson, 2007)

# Cognitive Biases

- Because biases are often unconscious and uncontrivable, it is difficult to avoid them by will.

- A way to avoid biases is by working and discussing with others who have different backgrounds or are from a different social/cultural group.

# Logic ≠ Reasoning

- The traditional way of learning critical thinking often proceeds by analyzing a chain of reasoning and evaluating it in light of formal and informal logic.

- Logic is a study of patterns, that is, a study of how the truth (and falsity) of a claim relates to the truth (and falsity) of other claims.

# Logic ≠ Reasoning

(1) Maru is a dog.

(2) If Maru is a dog, Maru is an animal.

(3) Therefore, Maru is an animal.

- This reasoning is logically good. But this just means that if (1) and (2) are true, (3) is impossible to be true.
- You may have strong evidence against (3), independently of your evidence for (1). Then, you should reason to the conclusion that (1) is false. (Harman, 1986)

# Logic ≠ Reasoning

(1) If you studied hard, you must have passed the exam.

(2) You have passed the exam.

(3) Therefore, you studied hard.

- This is a logically fallacious piece of reasoning. But this just means that even if (1) and (2) are true, (3) may be false.
- The reasoner may have evidence that students' effort is the most important factor for passing the exam. (Burke, 1994)
- Usually, context can convey extra information required for evaluating reasoning.

# Logic ≠ Reasoning

- What you should reason and believe depends on what evidence you have, as well as logical rules.
- It's desirable for any person to have all the relevant evidence, but this is too difficult for any single person.
- Usually, the more persons there are, the more evidence they have.

# Ground Rules for Productive Discussion

- Everyone offers relevant information
- Everyone's ideas are treated as worthwhile – but are critically examined
- We ask each other questions
- We ask for reasons and give them
- We try to reach agreement
- People trust each other and act as a team!

Littleton & Mercer (2013), p. 37

# Conclusion (1)

- The traditional way of learning critical thinking emphasizes critical thinking as independent and autonomous.
- This is problematic because critical thinking often requires collective inquiry.
- Three reasons are given for this claim:
  1. Many problems are complex.
  2. Human individuals are subject to biases.
  3. Logic is different from reasoning.

# Conclusion (2)

- Collective inquiry needs autonomous thinkers to be productive.
- If thinkers simply accept or listen too much what others say, it will reduce cognitive diversity. Thinks need to stand by their guns unless good reason to do otherwise is given.  (Lorenz et al, 2011)

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