AKITA INTERNATIONAL UNIVERSITY GLOBAL REVIEW

Volume XII
2020

AIU
Global Review

Volume 12
2020

Published by
Akita International University
Press

Akita, Japan
2020

CONTENTS

Articles

List of Contributors
(Alphabetical Order by Surname)

CHRISTEN Katherine Carr

Katherine Christen, Ph.D., is a native of Hamilton, Ohio, where she has been a high school English teacher in the public school system for 35 years. Dr. Christen graduated with her Bachelor of Science degree in English education from Miami University in Oxford, Ohio, where she spent her junior year studying abroad in Luxembourg. Before completing her undergraduate degree, KT began her Med in Education Administration and completed it, along with her principal's certification in 1989. Dr. Christen received her doctorate in Educational Leadership from the University of Cincinnati in Cincinnati, Ohio, in 2005; it was during her doctoral journey that she was fortunate enough to study and learn under the tutelage of Dr. James Koschoreck, co–author. In addition to teaching in the public schools, Dr. Christen has been an adjunct professor of education at the University of Cincinnati since 2008. Dr. Christen's most recent accolade was being nominated by her peers as the Harry T. Wilkes' Educator of the Year. She lives in Hamilton with her husband, Keith, along with three teenage children, Chloe and twins Carly and Carson, and four felines.

EGRI–NAGY Attila

Attila Egri–Nagy, Ph.D., is an Associate Professor of Mathematics at Akita International University. His doctorate is in computational abstract algebra from the University of Hertfordshire, UK. Before his graduate studies, he worked as a software engineer in Helsinki, Finland. His research interests span a broad spectrum, including mathematics, computer science, evolutionary computation, bacterial phylogenetics, and philosophy. His current focus is on artificial intelligence applications in human learning and knowledge creation.

KOSCHORECK James W.

James Koschoreck, Ph.D. is an Associate Professor in the Educational Leadership Program at Texas State University. Currently he serves as the Director of the Ph.D. Program in School Improvement. Dr. Koschoreck's research interests include policy analysis

and gay/lesbian issues in educational leadership. As a scholar/activist engaged in promoting issues of social justice, he challenges the taken–for–granted social normalizations in the public schools. His work has appeared in journals such as the *International Journal of Leadership in Education*, *Education and Urban Society*, the *Journal of School Leadership*, and the *Journal of Curriculum Theorizing*, among others. He has co–edited an issue of the *Journal of School Leadership* with Catherine Lugg, which focuses on sexual minority school leaders. He co–edited a book titled *Sexuality Matters: Paradigms and Policies for Educational Leaders*.

Call for Manuscripts

Akita International University Global Review is now accepting manuscripts for Volume 13 (2021) and is open to all disciplines and research areas. It is our hope to receive many manuscripts of excellent quality from not only from AIU faculty, but also scholars outside of the AIU community. The journal accepts submissions on a rolling basis. As they are successfully reviewed and revised, manuscripts will be published online.

Why publish in *AIU Global Review*?
1. Every manuscript goes through a double-blind review process.
2. We never charge authors to publish their work.
3. AIU Global Review is an open-access journal.
4. The journal is now (soon to be) indexed through J-STAGE, which means your work will appear in Google Scholar, EBSCO, Scopus, CrossRef, and many other international academic databases (see https://www.jstage.jst.go.jp/static/pages/JstageServices/TAB1/-char/en for details).
5. Although our journal is interdisciplinary, in order to have a more uniform look, we now require all submissions to follow APA 7th edition guidelines. Please format your paper accordingly. If you are unfamiliar with APA 7th edition, there is an excellent resource available here: https://owl.purdue.edu/owl/research_and_citation/apa_style/apa_formatting_and_style_guide/general_format.html

Important Information for Manuscript Preparation

Manuscripts for Volume 13 (2021) of the *AIU Global Review* must be sent to AIU Press (aiupress@aiu.ac.jp) as an attachment to an email in MS Word (PDFs and other formats will not be accepted). All manuscripts undergo double-blind peer review by at least two qualified scholars selected by the editor-in-chief. Please note: to be included in volume 13, we must receive your manuscript by November 1st, 2021 in order to allow sufficient time for the blind review, revisions, and so forth. Manuscripts received after this date will be considered for volume 14.

Manuscripts MUST conform to the following guidelines:

1. All articles must be the result of original academic research bringing new elements to scholarship and of up to 10,000 words (or up to 1,000 words for a book review), including references. Please note that the journal also welcomes articles on pedagogy, empirical or theoretical in nature, with a clear potential for contributing to the relevant academic field either by their innovative approaches or by their theoretical elaboration going beyond a narration of personal experiences;

2. Manuscripts are to be submitted in Microsoft Word format, following APA 7th edition guidelines, including, but not limited to:
    - Title case capitalization for all headings
    - Single space between sentences
    - Provide DOI links for all sources

3. Include a concise abstract at the beginning of the manuscript (200-250 words), with three to five key words.

4. Do NOT enumerate headings.

5. Italicize all non-English words, as well as titles of books.

6. No automatic (i.e., extra) spacing before and after paragraphs.

7. All sources must be properly cited according to APA 7th ed.

8. Footnotes should be avoided. Endnotes should be used sparingly and only when absolutely necessary.

9. All tables, figures, or other illustrations can be provided in color or black-and-white format. NOTE: It is the author's responsibility to seek appropriate copyright permissions.

10. Attach a one-paragraph biography when submitting your manuscript.

11. All correspondence, including your submission, should be sent to aiupress@aiu.ac.jp.

The "Trumpuffocation" of American Youth: A Critical Look at How the Trump Administration's Discourse Has Suffocated Truth and Decency and its Effect on Some Adolescents

Katherine Carr Christen
Hamilton High School

James W. Koschoreck
Texas State University

Abstract

Although politicians from all political parties at all levels of government lie for a multitude of reasons, President Donald J. Trump has redoubled the practice to levels previously unseen in American politics. His distortions of the truth—oftentimes without rhyme or reason—have left many of his opponents and even some of his political allies stymied as to their purpose. This paper represents a critical examination of the effect his lies, distortions of the truth, and bullying has on students in a high school in Ohio. We end this critical analysis with a series of policy implications for educators as they struggle to help their students to make sense of the world in today's charged environment.

All administrations lie at times, but under the Trump administration, lying has become normalized, a calling card for corruption and lawlessness that provides the foundation for potential authoritarianism. Trump distorts truth for "ideological, political, or commercial reasons. Under the Trump administration, lying and spectacles of fakery have become an industry and tool of power" (Giroux, 2018, "The Truth is Dangerous" section). Not only does Trump relish lying incessantly, he has also attacked many, many people with demeaning and degrading tweets, racial slurs, and jejune name calling. The insidious lies and the bullying behavior of Donald J. Trump have become so commonplace and ubiquitous that it is almost a joke; but what is not funny is the effect that his

constant barrage of lies and harassing tweets and statements to the media have on the youth of America. In this article, we hope to demonstrate the dangerous effects of Trump's lying and bullying on children in one high school in the Midwest of the United States. For years, schools have implemented comprehensive policies and programs to prevent and address bullying, and in many schools these programs have made a real difference in creating a culture of respect. Unfortunately, due to the erratic actions of one man, much of that hard work has been undone. Furthermore, Trump has created a dialogue of lies and "alternative facts" through his own voice and the voices of those who work within his administration. Children and youth hear the words adults hear. They hear them on the Internet, over a shoulder, and repeated by other kids on the playground or in the classroom. And words matter. They shape what young people think about themselves, each other, adults, and their country. Thus, this article uses the term "Trumpuffocation" to represent the suffocation of truth, respect, and empathy by Trump and his current administration. This paper will examine the historical significance of lies and bullying in past presidential administrations, the current effect of Trump's pervasive lies and bullying on our adolescents today, and the challenges that educators face in this frightening culture. Finally, a framework will be provided by which educators can attempt to empower and enfranchise students and help them to engage in a new language that embraces respect, empathy, and a new framework by which they can make sense of the current incendiary climate and move forward toward a dialogue of peace, respect, and acceptance.

Acknowledgement of our Positionalities

Before proceeding to the arguments we make in this article, we wish to acknowledge our beliefs relevant to these matters. Transparency has been the rhetoric espoused by the Trump administration since its start in 2016; therefore, we wish to also be transparent by admitting our bias. Both of us are educators and adhere to a liberal philosophical and political ideology, and, thus,

are admittedly both anti–Trump—against the preponderance of his policies, but strongly opposed to the personal philosophies and ideals of Donald Trump. While our main intent is to give an overview of the demeaning rhetoric and damaging bullying illustrated by Trump during his presidency and its effects on the adolescent population, our bias is intrinsic in this discussion. Although the bias may be inherent, our main objective is not just to illustrate the abhorrent behavior and language of President Trump, but more importantly, to give educators tools in which to combat the rhetoric—a discourse for change.

Trump and a History of Lies

When Huey Long was running for office in Louisiana, he told crowds that when he was young, he would take his Catholic grandparents to mass using the family horse and buggy. When a surprised friend said, "I didn't know you had Catholic grandparents," Long replied, "Don't be a damn fool. We didn't even have a horse."

Long was a governor and a U.S. senator in the 1920s and 30s, an innocent age when politicians carefully rationed their lies, dispensing them for specific purposes and striving to keep them believable. He might find himself unable to function in the era of Donald Trump, who churns out fiction nonstop with no rhyme, reason, or restraint. Even after two years on the political stage, Trump continues to outdo himself; his penchant for lies is comparable to an alcoholic's thirst for a drink—he lives for the next one and cannot abstain, no matter what it costs him (Chapman, 2017).

According to Adams (2019), Trump's endless lying is a major element in the suspension of rationality. He lies about everything, outrageous lies, small lies, lies about important things, and lies about things that are demonstrably untrue. The effect is mind numbing. It is impossible to keep up with the deception, especially over time, and rationality itself is the victim. Like a hallucination, the boundaries between reality and unreality dissolve. Research has demonstrated that "when a falsehood resonated with peo-

ple's politics, asking them to imagine counterfactual situations in which it could have been true softened their moral judgments … [making] a lie feel 'truthy' enough to give the liar a bit of a pass" (Effron, 2018, para. 11).

He lies about everything—from the size of crowds at his rallies (Hutzler, 2018) and where his father was born (Blake, 2019) to more important matters such as his son meeting with representatives from Russia (Hill, 2018). That is the most dangerous element of his lies—he lies when he does not have to lie or when the lie does not benefit him in any way. According to Kessler et al. (2020), Trump has lied well over 20,000 times as of July 13, 2020:

> It took President Trump 827 days to top 10,000 false and misleading claims in The Fact Checker's database, an average of 12 claims a day. But on July 9, just 440 days later, the president crossed the 20,000 mark—an average of nearly 23 claims a day over a 14–month period. (paras. 1–2)

According to McGranahan (2017), though,

> politicians lie. This we know. This we expect. Citizens know this, and anthropologists know this. But for many of us in the United States right now—anthropologists included—it feels like we have surpassed 'politicians lie' as a normative or hegemonic sort of claim. Things feel different. Donald Trump is different. By all metrics and counting schemes, his lies are off the charts. We simply have not seen an accomplished and effective liar before in US politics. (p. 243)

These intentional lies or "alternative facts" (Obeidallah, 2017) as coined by Kellyanne Conway, counselor to President Trump, are not just manifestations of a political stretching of the truth. Such lies can have dire consequences.

> Racist lies, or those based on derogatory views of a specific group, convert prejudice to truth and in doing so can enable violence, be it symbolic, structural, verbal, or physical. Trump's statements sometimes grow into general and even universal statements out of single or specific incidents, amplifying the

behavior of one or some to a truth about all. (McGranahan, 2017, p. 244)

Trump and Incessant Bullying, Name Calling, and Their Effects

In addition to President Trump's lies and statements of "alternative facts," he also has a penchant for name calling and bullying, even though his wife, Melania, has begun an anti–bullying campaign and has made the fight against bullying one of her main goals as First Lady. However, while the First Lady may be focusing on a movement that denounces and dissuades bullying, her husband's inflammatory rhetoric has inspired and incited people to violence from across the political spectrum. As a result of unprecedented violence against minority groups, Human Rights Watch (2017) listed Trump's election to president of the United States as a major threat to human rights in its *World Report 2017: Demagogues Threaten Human Rights*.

Bullying, in a wide sense, is the systematic abuse of power (Smith & Sharp, 1994), and it has been present in almost every institution or social relation for many years—schools, churches, inside families, and in the workplace (Nansel et al., 2001). Acts like intimidation, mistreatment, harassment, and discrimination are no longer just anecdotes or isolated events seen as a rite of passage; in our society today, these acts of malfeasance are perpetuated by the very governmental institution that is supposed to lead our country as a beacon of moral conscience. Instead, the leader of the country is a malignant narcissist whose name calling, bullying, and lying have become commonplace. And it is his behavior that greatly affects and influences young people who are some of the most vulnerable and malleable minds to bend. Trump is seen as such a threat that the National Education Association saw this threat and in 2016 announced a six–figure digital ad and mail campaign to tie bullying and fear in the classroom to Trump who was merely the Republican nominee at the time (Collins, 2016). According to a Southern Poverty Law Center report, the 2016

presidential election (and Trump in particular) is producing an alarming level of fear and anxiety among children of color and inflaming racial and ethnic tensions in the classroom (Collins, 2016).

Bullying is recognized as a serious concern that affects approximately 21% of students ages 12 through 18 in the United States (Musu–Gillette et al., 2017). Abundant evidence shows that peer victimization, especially bullying, is associated with a decline in student engagement and academic achievement (Eisenberg et al., 2003; Juvonen et al., 2003; Juvonen et al., 2011; Nansel et al., 2001). Student victims of bullying also exhibit emotional adjustment problems and are at increased risk for long–term mental health problems such as depression (Benedict et al., 2015; Hong & Espelage, 2012; Vaillancourt et al., 2015). Furthermore, pervasive bullying and teasing has a general effect on school climate that affects the student body as a whole (Huang & Cornell, 2019).

Reports have shown that minority youth have historically been especially vulnerable to bullying, which has led to the establishment of anti–bullying regulations in schools across the nation (Bazelon, 2016). Soon after the election of Trump to the presidency of the United States, there were already indications that "bullying, harassment and racist displays around the country" (Bazelon, 2016, para. 3) were sharply on the rise. As an example, in a survey conducted at an urban school district in Ohio, 70.5% of the students surveyed said that President Trump influences bullying and lying among their adolescent population (Christen, 2019).

According to Musu–Gillette et al. (2017), the rates of bullying in schools have decreased since 2005, yet numerous media reports have claimed that instances of racially and sexually related incidents are on the rise because of the election of Trump to the presidency (Bazelon, 2016). Numerous news reports detailing school bullying in which students have made comments linked to the newly elected president have been made (Samaha et al., 2017). Thus, the assumption can be made that the election of Donald Trump was the catalyst for this increase in bullying. The National Education Association (Blad, 2016) as well as experts on bullying

(Juvonen, 2017) have characterized President Trump as engaging in bullying with his harsh and demeaning statement.

Obviously, it is difficult to demonstrate a causal link between statements made by a public figure and schoolyard bullying. Nevertheless, there are incidents in which youth made threats and jeering statements that closely matched language used by President Trump (Thomsen, 2017). Such incidents are suggestive of the social learning model of aggression and classic studies showing how easily children model the aggressive behavior of adults (Bandura, 1971). Students in an urban classroom in Ohio were asked to write about a time when they were ever made to feel like a lesser human being and one student wrote the following:

> The day after Donald Trump was elected President, I was at my locker unpacking my backpack when behind me I hear someone say, "Hey you!" I turned around to face the guy who had hollered at me. When I was looking him dead in the eyes, he had the audacity to say, "I can't wait until Trump deports your Mexican ass." I was mad for all of a minute. The I felt sad because the guy was uneducated and didn't know any better. I looked to my left and to my right to make sure there were not teachers around. I snatched the kid up by his shirt collar, told him that I was Fillipino [*sic*] Italian, told him that if he snitched on me for what I was getting ready to do he would have to deal with the Italian mafia. Then, I threw him into the nearest supply closet, and he was found 2 hours later.

Donald Trump and his insidious lies and his bullying behavior have become so commonplace and ubiquitous that it is almost a joke; but what is not funny is the effect that his constant barrage of lies and harassing tweets and statements to the media have on the youth of America (see, for example, Huang & Cornell, 2019; Pollock, 2017; Thomsen, 2017). Hence the title of this article uses the term "Trumpuffocation" to refer to the suffocation of truth that has transpired since Trump became president of the USA (Montgomery, 2017; Rose, 2017; Wilber, 2017). Truth and its counterpart—humanity—no longer can breathe amidst the rhetoric of dishonesty and cruelty espoused by Trump, and some of the most

affected victims of this are the youth of our country who now feel justification or vindication for illustrating bullying behaviors and not telling the truth. If the president of the United States can do it then why should they not be able to do the same? It is evident in the hallways of our public schools and in the increased disciplinary action in schools.

Several human rights and activist groups have conducted surveys which clearly and undeniably reveal that the continual bullying and name calling illustrated by Donald Trump (Cuomo, 2019), and his constant and rampant lies and bullying have truly had a great impact on adolescents in our country today. Bullying takes on many forms, and one of these tactics is calling people degrading or derogatory names to discredit and humiliate them. And Trump is not a master at much, but he is an expert when it comes to name calling; the following list compiled by Wolfe (2019) is just a sample of the numerous names he has called people either by way of his tweets or in interviews or speeches:

> Dumbo, crazy, sleepy, crooked, heartless, lyin', leakin', little, slimeball, shady, slippery, sneaky, flakey, lightweight, puppet, wacky, fat, cheatin', high crime, Mr. Peepers, the Nutty Professor, sleazy, pencil neck, cryin', fake tears, head clown, Mr. Magoo, dumb southerner, dumb as a rock, goofy, Pocahontas, the Indian, low–IQ, dopey, little rocket man, mad, sloppy, irrelevant, failing, no talent, marbles in the mouth, wacky nut job, broken–down hack, dumbest man on television, sour lemon, psycho Joe, sleepy eyes, fake, enemy of the people, bozo, horse face, punchy, goofball, Miss Housekeeping, lowlife, tainted, 1% and wild Bill. (para. 3)

Young people view the leader of the free world as someone who must commit to higher standards; therefore, if telling lies and calling people names is commonplace for the President of the USA, then they feel beholden to this behavior as well.

In 2018, Sword and Zimbardo summarized the findings of a report by the Human Rights Campaign that found a disturbing increase in the incidence of youth bullying since the 2016 presidential campaign. They note further that these findings corrobo-

rate those of a similar study conducted for the Southern Poverty Law Center, which provides further evidence of a potential relationship between Trump's bullying discourse and its effect on students.

Members of the adolescent population feel as though they are targets of this rhetoric and the discourse that suggests that somehow immigrants, legal or otherwise, are not really welcome in this country. This rhetoric is dangerous and is fervently embraced by Trump's followers. As a student expressed in a narrative written in May of 2019:

> I have had a few experiences where I have been treated less than human but one experience that does stand out happened when I was in 3rd or 4th grade. My family and I went to the bridge to go see the fireworks that happen every year for the 4th of July. When my family finally found a place to sit to watch the fireworks, a lady and her husband started saying things to us like go back to your country and then she said that she was going to call ICE on us.
>
> We were treated this way because of the way we look. We were being accused of being immigrants which was not true since we were all born in the U.S. Including my mom which was the person being mostly harassed.
>
> At the time I didn't really feel anything but confused. But now I feel angry after that situation because my mom was born in the U.S. and that was around the time when my uncle was gone for the military. I think people end up hating other groups because of how they are raised or their bad experiences. If somebody is growing up being told a certain group is bad and should be hated that person will probably hate that group as an adult.

In a recent activity in one of my classes, I asked students to write about their experiences with racism and bullying in the era of the Trump presidency (Christen, 2019). The poignancy of their responses is striking, as the following example illustrates.

> The time that I felt attacked because of my skin was back in 2017 when Trump was just elected. It was on July fourth—my

little sister's birthday. My family was out trying to have fun and enjoy the day and see the fireworks. We got our stuff put down on the grass and waited for the fireworks to start. All of a sudden there were these people yelling at us and they said, "get out of here and go back to your country beaners and also build the wall." After they said that my little sister started to cry which made me cry and made my brother and my dad really angry. Which made us want to do something about it, but my mom felt like we were being threatened and wanted to leave. And so we left but those words have stuck with me for 2 years now and I can't forget them. I just can't believe how people can be so disgusting to say those words.

Similarly, another student expressed fear, anxiety, and frustration at the racist behaviors of police officers that pulled his family over without any apparent explanation.

This happened a couple of years ago right after the election of Trump as president. We were driving to New Mexico but at the time were somewhere in Texas. We were pulled over but never given a reason even when we asked why. My stepdad was just told to step out of the car, and with his hands on the steering wheel pointing out every move he was making he slowly did so. Although the cops didn't give us a reason for pulling us over, we knew it was because there was no reason, we were pulled over because we were 3 Mexicans on a highway in a primarily white area. The cop took my stepdad to run his name through the system, the cop behind him came to my side of the car where I was sitting in the front and my older brother was in the back. I was young, scared and crying because I knew of all the bad things that were happening and knew the possible negative events that could occur. I knew my stepdad had done nothing wrong, but I couldn't help but be scared of the police, especially with how me and my brother were being treated. The cop was constantly yelling at me and aggressively questioning me. In an angry tone the cop asked me "why are you crying, what are you people hiding?" At this point my older brother stepped into the conversation and explain the situation to the cop. The cop still acting hostile and angry was shocked when the other cop returned with my stepdad saying his record was clean and we were free to go; The cop on my side of the window walked away muttering under his breath "surprisingly."

Teachers reported that students were emboldened to use slurs and make inflammatory statements toward each other. Name–calling, threats of deportation, and worse, have caused some of the bullied children to suffer panic attacks and to even entertain suicidal thoughts (Sword & Zimbardo, 2018).

In fact, in an urban Midwestern school, "no contact agreements" have become commonplace among a freshman school population; kids can no longer learn harmoniously together, but rather must be put on orders that they can no longer have any contact with another human being. These "no contact agreements" are just a recent addition to the urban school's disciplinary structure (HCSD Disciplinary Code of Conduct). Donald Trump constantly tweets demeaning, bullying comments directed toward anyone with whom he does not agree or with whom might say something disparaging against him. Educators certainly face an incredible number of challenges, but what are the implications for teachers and school districts when the leader of the country uses his position of power to denigrate and attack individuals and groups of individuals? In a recent article, in fact, it was revealed that Trump has even used his status in social media to further bully others; it was revealed that between 2016 and 2019, Trump sent out over 11,000 tweets on his Twitter account. Of those tweets, over half of them attacked someone (Yourish, 2019). When adolescents witness a powerful man like the president of the United States participating in this kind of hurtful and damaging behavior, they feel that there is credence to doing the same. As we have seen earlier, studies show that bullying and name calling between adolescents has risen sharply in the last couple of years since Trump become president.

The dangerous effect of bullying on children is well–known by most in our country. It affects health, academic achievement, and in some cases, can lead to self–harm. For years, schools have implemented comprehensive policies and programs to prevent and address bullying. And in many schools, these programs have made a real difference in creating a culture of respect. Unfortunately, due to the erratic actions of one man, much of that hard work

has been undone. As Pollock (2017) states, the three challenges facing educators in "the era of Trump" (p. 426) are "to firmly denounce each incident of hate and intimidation on campuses," "to engage the facts," and "to protect the right to learn" (pp. 426–27).

Implications/Recommendations for Teachers

Although Pollock (2017) breaks down the challenges of teaching in the era of Trump into three steps, this article's authors suggest that these steps can be taken even further and can be summarized into what is termed the 4 "Es" for educators. First, educators must *engage* the facts and steadfastly hold onto the truth. Educators must engage students in lessons and a discourse which enables the marginalized to speak. Students must be engaged in a discourse of affirmation and acceptance. Educators must also *embrace* the language of love and acceptance and must reject the sexist, misogynistic, racist, and bullying rhetoric which is disseminated by Trump and his organization. Additinally, educators must *empower* students and give them a voice through lessons and discussions that allow students to tell their own stories. In classrooms across the country, educators must give students a voice of possibility and strength by concentrating on the stories of marginalized groups and how they have been treated historically as well as currently. Through these stories, there must also be an emphasis placed on empathy for groups who are systematically and categorically dehumanized and devalued. Finally, educators must *enfranchise* students. Minority students and students who are immigrants have been disenfranchised by the rhetoric emitted by Trump and his organization. As educators, we should place the focus upon these young people and their families; they must be given credence and shown acceptance in the classroom in hopes that it will also be embraced outside of the school setting.

Educators can change the current discourse and change it to a discourse of strength, acceptance, and empowerment; the job is a lofty one, but it can be done through knowledge and education. The damage of the Trump presidency has been done, but it

doesn't have to be permanent. Educators can use this "culture of cruelty" (Giroux, 2017) to further reiterate a culture of hope and empowerment. This means that as educators, we must halt behaviors which give credence to bullying, lying or racist behaviors immediately. As a high school English teacher, I take this charge extremely seriously; I cannot allow the culture of lies and misinformation to permeate in my classroom. A couple of weeks after the 2020 Presidential election, my English classes had a contest among the 3 classes. Upon hearing that they did not win, students in my class began uttering verbiage such as "they cheated," "it's not fair," and "it was rigged." I immediately stopped the class and explained that the other teams were just better on that day and at that given task, and that it was not acceptable to spout out these lies just because they had lost. As educators, we must constantly and consistently model the behavior which we want to see from our students.

In addition to all the many duties an educator must face each day in and out of the classroom, implementing the additional practices of the 4 "Es" against "Trumpuffocation" places a particular burden on educators, to be sure. But what choice do we have but to engage? And who better than us to facilitate dialogue and learning? We can and must support each other in this work. As a big team of educators, we are better equipped for the job than anybody. Therefore, as educators we must not turn a blind eye to the bullying, lies, and racism often promulgated by the current administration. Instead, we must face it head on…educators must use these instances of vile rhetoric to engage students in a more empowering and meaningful dialogue which embraces acceptance and empathy.

Professionals in education must remain at the vanguard of working against hate and gluing together the nation in the months and years to come. We help promote the next generation in environments more diverse in race, income, nationality, and political perspective. As educators, we are in a position of power to engage our students in the truth, empower them with a critical discourse, and encourage empathy and acceptance. Therefore, educators

must rise above the lies, bullying, and name calling and engage in a discourse that fights against the "Trumpuffocation" of our American youth.

Resources for 4E Implementation

The following short list contains exceptional resources for educators in which they can find lesson plans and ideas on how to promote the 4E philosophy and engage in a transformative and liberating discourse.

- Teaching Tolerance (https://www.tolerance.org)
- Edutopia Teacher Resources for Anti–bullying (https://www.edutopia.org/article/bullying-prevention-resources)
- Southern Poverty Law Center (https://www.splcenter.org)
- Anti-defamation League (https://www.jewishvirtuallibrary.org/anti-defamation-league-jewish-virtual-library)
- National Holocaust Memorial Museum (https://www.ushmm.org)

In addition, we direct the readers to an extensive list of resources for educators on bullying prevention that has been compiled by the Making Care Common Project (n.d.) at the Harvard Graduate School of Education.

References

Adams, K. A. (2019). Trump and the social trance. *Journal of Psychohistory, 46*(4), 238–258.

Bandura, A. (1971). *Social learning theory.* General Learning Corporation.

Bazelon, E. (2016, November 16). Bullying in the age of Trump. *The New York Times.* https://www.nytimes.com/2016/11/16/opinion/bullying-in-the-age-of-trump.html

Benedict, F., Vivier, P. M., & Gjelsvik, A. (2015). Mental health and bullying in the United States among children aged 6 to 17

years. *Journal of Interpersonal Violence, 30*(5), 782–795. https://doi.org/10.1177/0886260514536279

Blake, A. (2019, April 2). Trump wrongly claims his dad was born in Germany – for the third time. *The Washington Post.* https://www.washingtonpost.com/politics/2019/04/02/trump-wrongly-claims-his-dad-was-born-germany-third-time/

Blad, E. (2016, October 3). Trump inspires school bullying: NEA says in home stretch campaign against him. *Education Week.* http://blogs.edweek.org/edweek/campaign-k-12/2016/10/trump_inspires_school_bullying.html

Chapman, S. (2017, August 4). Donald Trump's pathetic lies. *Chicago Tribune.* https://www.chicagotribune.com/columns/steve-chapman/ct-donald-trump-pathetic-lies-perspec-20170804-column.html

Christen, K. C. (2019). [Unpublished raw data on the influences of Trump on bullying and lying amongst adolescent populations].

Collins, E. (2016, October 3). National Education Association aims to tie bullying to Trump. *USA Today.* https://www.usatoday.com/story/news/politics/onpolitics/2016/10/03/national-education-association-trump-bullying/91480920/

Cuomo, C. (2019, August 30). *Cuomo revisits Trump supporters lying about Trump lying* [Video]. CNN. https://www.cnn.com/videos/politics/2019/08/30/cuomo-closing-argument-trump-supporters-lying-about-lying-vpx.cnn

Effron, D. A. (2018, April 28). Why Trump supporters don't mind his lies. *The New York Times.* https://www.nytimes.com/2018/04/28/opinion/sunday/why-trump-supporters-dont-mind-his-lies.html

Eisenberg, M. E., Neumark–Sztainer, D., & Perry, C. L. (2003). Peer harassment, school connectedness, and academic achievement. *Journal of School Health, 73*(8), 311–316. https://doi.org/10.1111/j.1746-1561.2003.tb06588.x

Giroux, H. A. (2017, March 22). *The culture of cruelty in Trump's America.* Truthout. https://truthout.org/articles/the-culture-of-cruelty-in-trump-s-america/

Giroux, H. A. (2018, June 12). *Trump's relentless lies demand we make truth telling great again.* Truthout. https://truthout.org/articles/henry-a-giroux-trumps-relentless-lies-demand-we-make-truth-telling-great-again/#

Hill, J. (2018, July 27). *President denies knowing about Trump Tower meeting with Russians, despite Michael Cohen's claim.* ABC News. https://abcnews.go.com/Politics/trump-knew-june-2016-trump-tower-meeting-russians/story?id=56860101

Hong, J., & Espelage, D. (2012). A review of research on bullying and peer victimization in school: An ecological system analysis. *Aggression and Violent Behavior, 17*(4), 311-322. http://www.sciencedirect.com/science/article/pii/S1359178912000250

Huang, F. L., & Cornell, D. G. (2019). School teasing and bullying after the presidential election. *Educational Researcher, 48*(2), 69–83. https://doi.org/10.3102/0013189X18820291

Human Rights Watch. (2017). *World report 2017: Demagogues threaten human rights.* https://www.hrw.org/sites/default/files/world_report_download/wr2017-web.pdf

Hutzler, A. (2018, October 23). Donald Trump is still lying about his crowd sizes almost 2 years into his presidency. *Newsweek.* https://www.newsweek.com/donald-trump-lying-about-crowd-sizes-rally-1183076

Juvonen, J. (2017). I study the psychology of adolescent bullies. Trump makes perfect sense to me. *The Washington Post.* https://www.washingtonpost.com/posteverything/wp/2017/05/23/i-study-the-psychology-of-adolescent-bullies-trump-makes-perfect-sense-to-me/?utm_term=.00afbb3cec40

Juvonen, J., Graham, S., & Schuster, M. (2003). Bullying among young adolescents: The strong, the weak, and the troubled. *Pediatrics, 112*(6), 1231–1237.

Juvonen, J., Wang, Y., & Espinoza, G. (2011). Bullying experiences and compromised academic performance across middle school grades. *The Journal of Early Adolescence, 31*(1), 152–173. https://doi.org/10.1177/0272431610379415

Kessler, G., Rizzo, S., & Kelly, M. (2020, July 13). President Trump has made more than 20,000 false or misleading claims. *The Washington Post.* https://www.washingtonpost.com/politics/2020/07/13/president-trump-has-made-more-than-20000-false-or-misleading-claims/

Making Care Common Project. (n.d.). *Bullying resource list.* Harvard Graduate School of Education. https://mcc.gse.harvard.edu/resources-for-educators/bullying-resource-list

McGranahan, C. (2017). An anthropology of lying: Trump and the political sociality of moral outrage. *American Ethnologist, 44*(2), 243–248. https://doi.org/10.1111/amet.12475

Montgomery, M. (2017). Post–truth politics? Authenticity, populism and the electoral discourses of Donald Trump. *Journal of Language and Politics, 16*(4), 619–639. https://doi.org/10.1075/jlp.17023.mon

Musu–Gillette, L., Zhang, A., Wang, K., Zhang, J., Kemp, J., Diliberti, M., & Oudekerk, B. A. (2018). Indicators of school crime and safety: 2017 (NCES 2018–036/NCJ 251413). National Center for Education Statistics.

Nansel, T. R., Overpeck, M., Pilla, R. S., Ruan, W. J., Simons–Morton, B., & Scheidt, P. (2001). Bullying behaviors among US youth: Prevalence and association with psychological adjustment. *JAMA: The Journal of the American Medical Association, 285*(16), 2094–2100.

Obeidallah, D. (2017, January 23). *Dear team Trump, "alternative facts" are lies.* CNN. https://www.cnn.com/2017/01/22/opinions/alternative-facts-lies-obeidallah-opinion/index.html

Pollock, M. (2017). Three challenges for teachers in the era of Trump. *Educational Studies, 53*(4), 426–427. https://doi.org/10.1080/00131946.2017.1286590

Rose, J. (2017). Brexit, Trump, and post–truth politics. *Public Integrity, 19*(6), 555–558. https://doi.org/10.1080/10999922.2017.1285540

Samaha, A., Hayes, M., & Ansari, T. (2017, June 6). *Kids are quoting Trump to bully their classmates and teachers don't know what to do*

about it. BuzzFeed. https://www.buzzfeed.com/albertsamaha/kids-are-quoting-trump-to-bully-their-classmates

Smith, P. K., & Sharp, S. (Eds.). (1994). *School bullying: Insights and perspectives.* Routledge.

Sword, R. K. M., & Zimbardo, P. (2018, January 30). The Trump effect: An update. *Psychology Today.* https://www.psychologytoday.com/us/blog/the-time-cure/201801/the-trump-effect-update

Thomsen, J. (2017, June 6). Schoolkids using Trump's words to bully classmates: Report. http://thehill.com/blogs/blog-briefing-room/336582-kids-quote-trump-to-bully-each-other-at-school-report

Vaillancourt, T., Sanderson, C., Arnold, P., & McDougall, P. (2015). The neurobiology of peer victimization: Longitudinal links to health, genetic risk, and epigenetic mechanisms. In C. P. Bradshaw (Ed.), *Handbook on bullying prevention: A life course perspective* (pp. 35–47). NASW Press.

Wilber, K. (2017). *Trump and a post–truth world.* Shambala Publications.

Wolfe, J., (2019, May 10). Trump's list of insults, name–calling [Letter to the editor]. *Tulsa World.* https://www.tulsaworld.com/opinion/letters/letter-to-the-editor-trump-s-list-of-insults-name/article_b8bbcf7e-87b5-520c-9b2c-7087a254972b.html

Yourish, K. (2019, November 2). How Trump's 11,000 tweets have reshaped the presidency. *The New York Times.* https://www.nytimes.com/interactive/2019/11/02/us/politics/trump-twitter-presidency.html

Playing the Game of Go in an Integrated Mathematics and Computing Course[1]

Attila Egri–Nagy
Akita International University

Abstract

Acquiring knowledge in mathematics and computing is increasingly needed in almost all areas of study. At the same time, it is difficult to motivate these subjects for students in other majors. One reason could be the lack of naturally arising interest — questions for which the students genuinely seek answers. Playing the ancient game of Go can be the source of motivating problems, and the game itself can provide a shared base experience for the whole class. Here we describe the incentives for, and the design decisions in, developing an integrated artificial intelligence course centered around the game. Following the traditional culture of Go, this potent combination leads to self–reflection and metacognition techniques. Transferring these skills could also help students in other subjects.

Due to rapid technological (the advance of automation) and societal changes (demographic shifts, declining university enrollments), education on all levels, admittedly or not, is in an existential crisis. How do we prepare students for their future life? What should we teach and how? No one can predict the future job market. Still, there are some short–term strategies, such as teaching what is needed at the moment (e.g., mathematical and computing skills) and long–term ideas for nurturing abilities for coping with constant change (Harari, 2018). I will address both issues. First, I will identify a factor contributing to current failures in mathematical (epitomized in Lockhart & Devlin, 2009) and computational subjects.

Go players are keen on reasoning for the benefits of playing the game, since we tend to share what we enjoy. This paper can

also be viewed as such an argument, with a particular focus on education.

Motivating Studies

It is an everyday observation that learning could feel effortless if someone has a genuine interest in a subject. I take this as my central assumption for improving the teaching and learning process in an undergraduate mathematics and computing course. This is, of course, a simplified way of looking at the problem of learning, since there are several conditions other than motivation for achieving an optimal experience, a flow state (Csikszentmihalyi, 2009).

External Motivation Does not Transfer to Internal

Students may be very well motivated in their studies (e.g., preparing for an entrance exam or working towards a degree). However, these external incentives may not automatically become everyday interests in particular subjects. Courses in mathematics and computing are particularly prone to this type of failure. External pressures are high for passing standardized tests. Math anxiety develops very early (Sokolowski & Ansari, 2017). High–paid software engineering jobs are luring, but they require expertise in programming. Skills for writing computer code is known to be difficult to obtain (Jenkins, 2002), and it is usually hard–earned by countless hours of work. Without enjoying the coding assignments, it could become a painful activity. Computing subjects in general can be difficult to study for students without a genuine interest (either innate or developed) in symbolic languages and in computers' inner workings. Consequently, the learning process could lose much of its efficiency in terms of time versus the mastery of a skill.

Similar problems arise from the educator's perspective. It is not efficient to teach someone a method of solving a problem who does not happen to have that particular problem. It is also not exactly a nice experience, since it often involves exercising power to

force the person to pay attention. If all else fails in a lecture, the instructor can still say that the exam will have questions of the kind being discussed to convince students to work on the problems. Traditional mathematics education works mostly this way (Lockhart & Devlin, 2009). The assumption is that the algorithms we teach will be useful for the students at some later stage of their studies or subsequent professional work. This reasoning, no matter how correct it is, does not stop questions such as "Where am I going to use this?" A traditional math class is a bit like selling a useless product to a customer. Note that the salesperson could be honest and convinced about the utility of the item; nonetheless, the situation is damaging. In education, the price we pay is students' time and suffering. And again, this happens often despite good intention and due to poor pedagogy.

Mathematics has built up a false image of a purely intellectual endeavor; thus this field of study is usually perceived as disconnected from life. Computing is in a better position in terms of motivation, as it is conspicuously pervasive in our everyday life. However, even topics in computer science may be losing their immunity to indifference. The success of software technologies may suggest that there are no more problems to solve. For instance, explaining the PageRank algorithm to students born after Google requires depicting the age of Internet search where the relevant link was usually somewhere at the bottom of the page. Well functioning software tools could diminish the desire of understanding their underlying logic. The student has not experienced the problem, nor is there is evidence that this issue is important for society.

Creating Motivating Situations

Transmitting information in the "teaching as telling" model of learning is inefficient without making sure that the audience is in the disposition of receiving. Prior to imparting knowledge, we have to create situations in the classroom in which questions spontaneously arise, where students can face a real problem themselves. They need to meet a natural difficulty. Preferably it should

be the same obstacle for everyone, in order to make group work and collaboration possible. Then, we can deploy methods for obtaining solutions—either just giving them away, or even better, leading the students to discovery. To that end, the question arises: How to create motivating situations?

Playing Games

Playing games is an integral part of our culture (Caillois & Barash, 2001; Huizinga, 1949). It also evolved as a form of entertainment (Donovan, 2018). Games are mostly considered to be fun activities in which to engage. Therefore education can leverage them by tapping into this natural willingness and propensity. It is from this understanding that we are able to ask a more precise question: what game can we use to motivate studying mathematics and computing?

The Remarkable Properties of Go

For developing thinking skills by playing games, there is a wide range of choices. We can quickly narrow the choices down to traditional strategy board games, if we require a wide spectrum of expertise (i.e., the game cannot be mastered by humans in a short time) and if we want to have games with a long history and cultural embeddings.

Chess and Go are often singled out for their purported educational benefits. However, it appears to be notoriously difficult to pin down exactly the beneficial effects of playing. One might argue that it is difficult to measure the long–term effects (for young players), and standardized school tests may not be a good measure for assessing the impact of playing these board games (Rowson, 2019).

These two games also stand out for being the driving challenge for the development of artificial intelligence. Chess was the application domain for the field since its beginnings (Ensmenger, 2012), and Go was the final grand challenge in pure skill games

(Silver et al., 2016). AlphaGo's breakthrough caused a recent surge in wider scientific (Koch, 2016) and public interest in the game. Both Chess and Go are suitable for the purpose of building a course. Here I have chosen the game of Go due to its unique properties.

Go is a two–player, pure skill, and turn–based board game. The players put alternatingly black and white stones down on an initially empty grid. The goal of the game is to surround more territory than the opponent. Enemy stones can be captured as well by fully encircling them.

Go is Abstract and Complex

Being *abstract* means that unnecessary details are removed. Something is reduced to its essence and it can be defined in a succinct way. Moreover, abstract implies being non–specific. Therefore, something abstract can be related to a wide range of other things.

The rules of Go can be described in a couple of sentences. Nothing from the rules can be omitted without destroying the game. Chess is also an abstract board game, but on a different level, keeping some details of the real world. It is tied to kings and their armies, which of course still leaves plenty of possibilities for connecting to real life (Kasparov, 2007). We could leave out some of its rules (e.g., not including the bishop), which would give a different, but still chess–like game.

Complexity comes from the interactions of the simple parts of a system (Mitchell, 2009). A complex phenomenon is interesting, since we cannot summarize it with a single idea; thus, we cannot master it in one shot. In Go, complexity arises from the interaction patterns of the stones on the board.

Adding these two together, we conclude that Go is potentially connected to many interesting complex phenomena. This leads to the opportunity: insights gained in Go could be transferred to other fields of knowledge. This is the single general argument for playing Go in educational settings.

As a concrete example, we can consider the incomprehensible combinatorial chaos of Go (Tromp & Farnebäck, 2007), and how it is related to a grand cosmological picture. Meaningful games by competent players in creative competition are exceptional sequences of board positions. Beginners also learn quickly to distinguish between a random position and the snapshot of a game. We "live" in a tiny part of the vast possibilities of all possible legal board positions. This parallels how we are at home in the universe in a sense: only some very special configuration of material (e.g., the surface of a planet with a protective atmosphere is habitable for us). Random arrangement of particles does not provide suitable conditions for life, just like a random arrangement of stones, makes no sense for us.

It is a cliché that Go is like life itself. A game is a smaller version of our struggle for survival and prosperity (You & Cho, 2018). Or, the history of human civilization can be conceptualized as a giant game, in which natural disasters are moves by a formidable opponent, but the consequences of our own actions often catch us too.

On the board the arrangements of stones build up the emergent structures we talk about when discussing the game: good and bad shapes, such as groups of stones with "eyes." Individual stones do not matter, only their relationships. This is exactly the basic tenet of category theory, the "mathematics of mathematics" (Cheng, 2015). The primary interest is not the mathematical structures themselves, but their relations.

Furthermore, the objects of our world are built up from combinations of elementary particles and atoms via the interactions between them. It is often remarked that the number of positions on the full board is way bigger than the number of atoms in the universe. This comparison is unfair to the universe. The correct way would be using the number of all possible configurations of matter in the observable universe." Constructing any desired configuration of atoms, "transforming anything into anything that the laws of nature allows" (Deutsch, 2011) is the ultimate goal of engineering. On the Go board something similar can be realized.

Theoretically, when two players cooperate in making a game as long as possible, a large fraction of the space of all legal positions can be visited (Tromp & Farnebäck, 2007).

Therefore, in a very abstract sense, the game is a model of the universe. This is a grandiose metaphor, which can be exploited both for sciences and for the game. It also fits into a long tradition of using the Go board to represent many things, like the four seasons or the stars in the sky. Its abstract nature allows the game to symbolize anything that is important in a given age. The distinction between order and randomness permeates several branches of science. It is a fundamental issue even when the uniqueness and finiteness of our universe are questioned (Tegmark, 2014).

Thinking is Inevitable in Go

An interesting observation about the game is that "it makes you think" (Shotwell & Long, 2012). This is a surprising statement, since by definition this is true for all pure skill games. There are several reasons why emphasizing an obvious property makes sense.

1. Rote memorization has minimal effect, if any, on playing skills. This is even true for opening patterns, since the individual games differ after a couple of moves; unlike in Chess, where building an opening repertoire is important.
2. Pretending to make thoughtful moves without thinking does not seem to be possible. A lapse in attention is sensed by the opponent immediately, and it is widely believed that a player's approximate strength can be judged by a couple of moves in a game.
3. The apparent seriousness of the game, which is difficult to pin down, could contribute, too. Its culture and aesthetics of the equipment, as well as the time investment, might be factors. It is a shared experience of players that even casual games turn into serious ones.

When playing a game, some questions are inevitable. The immediate concerns are about a particular game. How do I make territory here? How should I protect my group? Then there is re-

flection on playing and improving on a larger timescale. For instance, How can one become a better player? Is there a sure winning strategy? What does it mean to be strong? We can rely on the appearance of these questions in the players' minds. Moreover, the answers in the context of artificial intelligence contain a fair amount of mathematical reasoning, most notably combinatorics, game theory, and probability theory. This is an ideal setup to teach general problem solving heuristic (Pólya, 1945) in the context of the game (Egri–Nagy, 2011).

Therefore, this game is an ideal candidate to serve as a "real–world" problem introduced in the classroom. As the rules are easy to learn, and it does not take too long to have a meaningful experience of elementary tactics and strategies, Go could give a shared background knowledge for everyone in the class. This does not imply that everyone has to be on the same playing level, because the handicap system of Go can equalize the fight.

The Positive Role of Artificial Intelligence

It is hotly debated how AI technologies will change our lives for better or worse. Considering all possibilities is an immense task (Tegmark, 2017). Here, I focus on some short–term benefits.

AI as a Mirror

Thinking is one of our most important abilities. Therefore, improving it is also critical. How can we improve our thinking? We have to think about our thought processes, reflect on them.

The advancement of AIs in Go could be viewed in many different ways (Egri–Nagy & Törmänen, 2020). For instance, losing the supremacy of human players can induce adverse reactions. However, some techniques are the vindication of human thinking. They are often modeled after our thought processes. Logical thinking in solving a Go puzzle is made precise and systematic in classical search algorithms (Russell & Norvig, 2009). Intuition is modeled by the pattern recognition of neural networks. The train-

ing algorithms for deep learning networks justify the best human learning method: playing and replaying games.

On the other hand, randomized algorithms, like random playouts in Monte–Carlo tree search are not something a human player could do. We cannot track meaningless random moves in our head. However, the strength of the randomized algorithms is prompting us to develop a better sense for probability and statistics.

The engineers of AlphaGo found a way to integrate the wisdom of human masters into a convenient "search engine" for the next move (Silver et al., 2016). This is putting the knowledge of all masters (all the game records, books, etc.) into a different container, an artificial neural network. Playing against AlphaGo is playing against all masters, not just a single opponent.

As the next step in the development of the software package, AlphaGo Zero could reconstruct and surpass all human wisdom in three days (Silver et al., 2017). This phenomenon is similar to what could happen in Go, where we failed as a species to fully understand the game. However, thinking that we had already discovered everything that can be known about the game is overconfident. We tend to put ourselves into a privileged position, as a final goal of evolution. This is a mistake, which can be seen easily by following the history of our species (Harari, 2015).

In a way, AIs provide a mirror for us. We can look into it and see ourselves: our logical thinking and intuition, and their limitations. Or, we can see our improved selves. The AIs can also give guidance on how to improve our thinking.

AIs as a Democratizing Force

Beyond teaching at the undergraduate level, another beneficial use of AI Go engines is that it makes learning the game easier for everyone. There is always a strong player ready to play. Moreover, with the advance of analysis tools, now everyone has a strong player with which to review a game. Like the printing press, knowledge is more democratically distributed, allowing ev-

eryone to enjoy the game more. The same happened in the world of chess (Kasparov, 2017).

It is more important to provide access not just to the game, but to the AI technologies themselves. This is an important role of university courses.

Knowledge Transfer

Knowledge transfer is the hallmark of successful learning (Barnett & Ceci, 2002). The question is how exactly to transfer and facilitate this knowledge from the game of Go. There are several possibilities.

1. Directly related courses, such as mathematics, statistics, programming, and machine learning, could benefit from a thoroughly discussed example.
2. Courses discussing the societal and political changes induced by the advance of AI technologies could be better understood by a clear understanding of these technologies' core concepts.
3. Studying, in general, could benefit from the experience of improving Go playing skills. Especially for beginners, practicing Go puzzles leads to quick improvement. Similarly, repeated exposure to fundamental ideas, instead of cramming the night before the exam, is essential in learning any subject. Of course, this connection is subtle enough that it requires explicit mentioning in the class.
4. The most speculative possibility for knowledge transfer is about life skills. Go is a game about finding the right balance between attacking and defending, between taking territory and letting the opponent live at some parts of the board. Managing life also requires the ability to find balance. For example, between study and social activities, between work and family, and so on.

Transferring skills between Go and mathematics or computer programming is not a straightforward process. As pointed out in Lee (2016), professional Go players often know little about mathematics since their education was focused solely on the game from

early on. The conclusion is clear: to play well, there is no need for mathematics. While in Europe and North America, where there used to be no professional systems, Go players were typically mathematicians or software engineers, hinting that these might be related skills. Outside Asia, people are often introduced to the game during their studies at university. However, these observations provide little insights into the possible connection.

As the previous research suggests, the transfer between the game of Go and mathematics cannot be direct. Mathematics is a symbolic language and Go is not. However, when we look at the thought processes involved in both fields, similarities arise. The expertise is built by transitioning through practice from a conscious step–by–step calculation process to a more automated pattern recognition ability. Similar to solving a Go puzzle (*tsumego*) by figuring out what move to choose next, the simplification of a logarithmic expression in algebra is about finding the right next move (i.e., choosing the appropriate law of logarithm). In both cases the trick is to choose suitable action from a set of possibilities, which could be a broad definition of computational thinking.

To improve this decision making process, the interaction between calculation and intuition can be improved by being aware of their capabilities (Kahneman, 2011). Therefore, I suggest that the transfer could happen on a metacognitive level. That is, the need for improving when playing games enforces self–monitoring. As a result, this skill of self–monitoring can be transferred to mathematical problem solving, where it is generally thought to be beneficial (Schneider & Artelt, 2010). *Metacognition* is the defining core of classical heuristics (Pólya, 1945). The strong game review culture of Go is an implementation of these principles (You & Cho, 2018). An aspiring Go player frequently both wins and loses games to find mistakes and methods for improvement. However, for a beginner player this might not be an obvious action to take. To promote self-reflection, we can use writing tasks (i.e., about the effectiveness of the chosen study methods and the comparison between natural and artificial intelligence) and oral presentations

(i.e., game reviews and Go puzzles). The reflective thought process could increase the probability of knowledge transfer as well.

Summary

This article reviewed the potential benefits of using the game of Go in an undergraduate course. Based on cultural and educational considerations, I conclude that using an ancient game is a valid approach for tackling some current issues in liberal arts education. This theoretical analysis will be followed by an empirical investigation of a course implemented according to these guidelines.

References

Barnett, S. M., & Ceci, S. J. (2002). When and where do we apply what we learn?: A taxonomy for far transfer. *Psychological Bulletin, 128*(4), 612. https://doi.org/10.1037/0033-2909.128.4.612

Caillois, R., & Barash, M. (2001). *Man, play, and games.* University of Illinois Press.

Cheng, E. (2015). *How to bake Pi: Easy recipes for understanding complex maths.* Profile Books.

Csikszentmihalyi, M. (2009). *Flow: The psychology of optimal experience.* HarperCollins.

Deutsch, D. (2011). *The beginning of infinity: Explanations that transform the world.* Penguin Publishing Group.

Donovan, T. (2018). *It's all a game: A short history of board games.* Atlantic Books.

Egri–Nagy, A. (2011). "How to solve it?": The tsumego session. *Annales Mathematicae et Informaticae, 38*, 137–145. http://publikacio.uni-eszterhazy.hu/3248/1/AMI_38_from137to145.pdf

Egri–Nagy, A., & Törmänen, A. (2020). The game is not over yet: Go in the post–Alphago era. *Philosophies, 5*(4), 1–15. https://doi.org/10.3390/philosophies5040037

Ensmenger, N. (2012). Is chess the drosophila of artificial intelligence? A social history of an algorithm. *Social Studies of Science, 42*(1), 5–30. https://doi.org/10.1177/0306312711424596

Harari, Y. (2015). *Sapiens: A brief history of humankind.* Harper Collins.

Harari, Y. (2018). *21 lessons for the 21st century.* Random House.

Huizinga, J. (1949). *Homo ludens: A study of the play–element in culture.* Routledge.

Jenkins, T. (2002). On the difficulty of learning to program. *Proceedings of the 3rd Annual Conference of the LTSN Centre for Information and Computer Sciences, 4*(2002), 53–58.

Kahneman, D. (2011). *Thinking, fast and slow.* Giroux.

Kasparov, G. (2017). *Deep thinking: Where machine intelligence ends and human creativity begins.* Hodder & Stoughton.

Kasparov, G. (2007). *How life imitates chess.* William Heinemann.

Koch, C. (2016). How the computer beat the Go player. *Scientific American Mind, 27*, 20–23. https://doi.org/10.2307/24945452

Lee, H. (2016). *Outside the board: Diary of a professional go player.* Old Hickory Press, LLC.

Lockhart, P., & Devlin, K. (2009). *A mathematician's lament.* Bellevue Literary Press.

Mitchell, M. (2009). *Complexity: A guided tour.* Oxford University Press.

Pólya, G. (1945). *How to solve it.* Princeton University Press.

Rowson, J. (2019). *The moves that matter: A chess grandmaster on the game of life.* Bloomsbury Publishing.

Russell, S., & Norvig, P. (2009). *Artificial intelligence: A modern approach* (3rd ed.). Prentice Hall Press.

Schneider, W., & Artelt, C. (2010). Metacognition and mathematics education. *ZDM – Mathematics Education, 42*(2), 149–161. https://doi.org/10.1007/s11858-010-0240-2

Shotwell, P., & Long, S. (2012). *Beginning Go: Making the winning move.* Tuttle Publishing.

Silver, D., Huang, A., Maddison, C. J., Guez, A., Sifre, L., van den Driessche, G., Schrittwieser, J., Antonoglou, I., Panneershelvam, V., Lanctot, M., Dieleman, S., Grewe, D., Nham, J., Kalch-

brenner, N., Sutskever, I., Lillicrap, T., Leach, M., Kavukcuoglu, K., Graepel, T., & Hassabis, D. (2016). Mastering the game of Go with deep neural networks and tree search. *Nature, 529*(7587), 484–489. https://doi.org/10.1038/nature16961

Silver, D., Schrittwieser, J., Simonyan, K., Antonoglou, I., Huang, A., Guez, A., Hubert, T., Baker, L., Lai, M., Bolton, A., Chen, Y., Lillicrap, T., Hui, F., Sifre, L., van den Driessche, G., Graepel, T., & Hassabis, D. (2017). Mastering the game of go without human knowledge. *Nature, 550*, 354–359. https://doi.org/10.1038/nature24270

Sokolowski, H. M., & Ansari, D. (2017). Who is afraid of math? What is math anxiety? And what can you do about it? *Frontiers for Young Minds, 5*(57), 1–7. https://doi.org/10.3389/frym.2017.00057

Tegmark, M. (2014). *Our mathematical universe: My quest for the ultimate nature of reality.* Alfred A. Knopf.

Tegmark, M. (2017). *Life 3.0: Being human in the age of artificial intelligence.* Knopf Doubleday Publishing Group.

Tromp, J., & Farnebäck, G. (2007). Combinatorics of go. *Computers and Games*, 84–99. https://doi.org/10.1007/978-3-540-75538-8_8

You, J., & Cho, H. (2018). *Go with the flow: How the great master of Go trained his mind.* Influential Inc.

Notes

[1] The course "MAT 230: Igo Math—Natural and Artificial Intelligence and the Game of Go" was first offered at Akita International University in the winter semester of the 2018–2019 academic year. For more information, visit the website of the course at https://egri-nagy.github.io/igomath/.