SECTION X. BIOETHICS AND HISTORY & PHILOSOPHY OF SCIENCE
Paper Session I
Thursday Morning, 8:30 am – 12:00 pm
Arthur J. Bond Engineering Building, Room 101
Clark Lundell, Presiding

1. 9:00 PET: POLYETHYLENE TEREPHTHALATE; THE UBIQUITOUS 500 MILILITER WATER BOTTLE. *Clark Lundell,* Auburn University.

   In the USA, 50 pounds of PET plastic (water bottles and other food packaging) pass through 125 million households each year, totaling 6.25 billion pounds of PET per year. In the USA, 30% of PET produced each year is recycled, while the world recyclesless than 10% of PET production. .
   PET is associated with single-use plasticsthat is used for a few minutes in its life cycle and then discarded. It takes 77 million years to make the fossil fuels from which conventional PET is produced and thirty minutes to actively use and discard this material as a single-use water bottle.
   A PET bottle in a landfill takes 500 years to decompose. In the ocean, that same bottle breaks down into microplastics that also take 500 years. Microplastics are consumed by organisms as part of a food chain, which includes us.(Decomposition rates are estimates because PET material was only first introduced sixty years ago.)
   Since 2009, Coca-Cola has distributed more than 35 billion PET bottles worldwide. A small part of this production is plant-bottle packaging, which converts sugars in plants into ingredients that can make up 30% of recyclable PET plastic. It is possible to produce a 100% plant-based PET bottle, but the cost is high.
   Coca-Cola, PepsiCo, and Dr. Pepper are launching an "Every Bottle Back" initiative to keep bottles in recycling bins instead of oceans and landfills. World-wide recycling facilities are facing mounting challenges because China stopped buying two-thirds of the world's recyclable plastic in 2018.

2. 9:15 LIVING WELL WITH TWENTY-FIRST CENTURY TRANSFORMATIVE TECHNOLOGIES. *Jim Bradley,* Auburn University.

   Several twenty-first century technologies raise ethical issues that are not easily resolvable because they have moral systems that are commonly applied to other ethical problems. We are familiar with rule-based moral systems like utilitarianism (e.g. do thebest for the most persons), Kant's deontological ethics (e.g. do not lie because it is illogical to will that everyone lie all the time), and religion-based moral systems (e.g. treat others as you would be treated). One or another of these moral systems may be useful in day-to-day personal interactions, but they are not adequate for issues, such as personhood, human dignity, and human rights, raised by human reproductive cloning, embryonic stem cell, artificial intelligence, bio-chimera, brain organoid, and other modern technologies. A moral system based on teaching and nurturing certain virtues may be the best approach to making wise decisions and living well with these twenty-first century technologies.

3. 9:30 ETHICS OF CROSS-DISCIPLINARY STUDIO CRITIQUE TECHNIQUE: TWO ASSISTANT DESIGN PROFESSOR'S PERSPECTIVES. *Benjamin Bush*, Anna Ruth Gatlin, Auburn University.

Why is conducting an in-studio design critique mentally draining and ethically difficult? Because generating actionable, focused feedback is difficult, especially when faced with the ethics of delivering consistent critique across a diverse cohort.

There are three components to a high-quality design critique: analyzation, processing, and reciprocal communication. A design professor, faced with a classroom of 12-20 students who need personalized critique, must analyzethe students' work and simultaneously construct mental feedback that is delivered with reciprocal communication. The professor must choose the most appropriate way to deliver feedback that addresses the design brief and accommodates each student's learning stylethat builds on current understanding of design and considers preexisting feedback. This process is repeated, on average, every ten minutes for the next three hours, sometimes twice a day.

Each discipline is different, but the underlying ethics of critique remain the same: addressing inequities among a spectrum of students and meeting those inequalities where they help students achieve the goals of the design brief. Social class, privilege, and other factors should not affect a student's "voice" and their ability to produce excellent design work.Although, questions inevitably arise: Is it ethical to spend more time with a particular student, at the expense of time with other, more privileged students? Is it more ethical to give each student an equitable amount of time regardless of their actual need? This presentation explores the ethics of studio critique through a lens of critical theory and the lived experiences of two cross-disciplinary assistant professors.

4. 9:45 SEEING THE WORLD THROUGH A CLOUDED LENS: ABSTRACTION AND FUZZY VISION AS A DESIGN TOOL FOR CREATIVE PROBLEM SOLVING. *Brian LaHaie*, University of Georgia; Clark Lundell, Auburn University.

Ever see too clearly? Ever focus so intently on something that you can't see the bigger picture? We rarely get accused of thinking too clearly; yet, it is often our ability to abstract our concrete thinking and to soften our senses that ultimately lead to a higher order of creativity and problem solving. Not being able to see the forest from the trees is not a vision problem—it is a distance problem. Stepping back from the trees gives us the distance and perspective needed to see a more comprehensive picture.

This presentation explores the general ideas of abstraction as a means to achieving higher orders of thinking, relative to the arts and sciences. It demonstrates how distance can eliminate distracting details, thereby allowing fuzzy vision to clarify one's solutions. Social psychology has named this relationship between distance and abstraction as "construal level theory." The author explains the theory and uses it to demonstrate strategies for creative problem solving in the fine, applied, creative design, and other disciplines.

5. 10:00 **u TECHNOLOGY DESIGN: THE SCIENCE OF ART. *Evanthi Hettiaratchi,* Auburn University.

   The word "technology" in today's language conjures up the image of a computer or similar device and implies that a device is a tool, usually one that helps us gain knowledge or convenience. This characterization of "technology" as a tool makes sense; after all, the technological advances in our history include the invention of the wheel, writing, and weapons, all of which are fundamental tools. However, even though we often view technology of the past and the present as things that are simply meant to help accomplish a goal, the word itself carries the Greek root *tekhnē* meaning "art or craft" combined with the common "-logy," a suffix often translated as "the science of" something. Thus, technology is the science of art, and what better way to describe design? Perhaps, this is why today's tech companies produce such good examples of designed objects. For example, Google Chromecast is a device that allows the user to "cast" what is streaming on one device (phone, laptop, etc.) to the screen of the TV to which the Chromecast is connected. It basically makes the process of connecting a computer to a TV, via HDMI cable, a wireless affair. The Chromecast is small, hidden behind the TV screen, so why does it need to be modern, sleek, and streamlined like the wire it replaces? It doesn't, but Google makes it so because the elegant design enhances the user experience. This elegant design is the whole point of design: making a tool beautiful.

6. 10:15 **u Form and FunctionFORM AND FUNCTION. *Leah Marcus,* Auburn University.

   The corpus callosum, a thick layer of nerve fibers, connects the two sides of the brain. It provides a critical pathway of communication between the brain's right and left hemispheres. Likewise, objects that are designed to accommodate functional utility while also upholding aesthetic values foster greater productivity for mankind. Just as the brain would lack the ability to achieve a higher level of function without the corpus callosum, humans would lack the ability to achieve more effortless day-to-day function without designed objects. Merging utility and artistic value, designed objects exhibit a superior combination of function and beauty, compared to engineered or artful objects alone. For example, an everyday object, like a pair of sunglasses, is designed to provide protection from the sun while simultaneously adding a level of aesthetic significance, perfectly linking fashion and functionality. Objects like these are valuable tools, defined by theirpurpose of performance and style.

7. 10:30 **u HOLISTIC THINKING IN ARTFUL OBJECTS. *Jamie Clark,* Auburn University.

   Artful objects are created with the primary intention of evoking emotion. They are usually visually appealing or trigger a positive memory. Looking at an artful object for the first time may leave someone feeling happy or satisfied. For example, I'm in a store and see a beautiful bracelet with a sea turtle charm. It reminds me of my summers in Florida when I did conservation work by guarding sea turtle eggs and watching the hatched babies make their first contact with the

ocean. Now, I feel happy, nostalgic, or fulfilled. Artful objects are associated largely with the right brain. The right brain is creative and connected to arts, imagination, and most importantly, in this case, holistic thinking.
Holistic thinking is derived from Holism. Holism is the idea that systems should be seen as wholes rather than a collection of parts;for example, a human heart serves no purpose outside of a body and is interdependent on other organs. Holism is a term found in a range of subjects, such as science, sociology, economics, and philosophy. Its context determines whether it'll be associated with the right or left side of the brain. Holistic thinkers are almost always subjective and are more right brain oriented. Holistic thinking is the opposite of analytical thinking, so holistic thinkers don't give much attention to detail. They explore the idea of things being part of a complex whole and are always looking at the bigger picture. Because of this mentality, they may experience less stress as they attempt to reach their long-term, "big picture" goals. When something doesn't go as planned, a lot of people like to say something along the lines of "everything happens for a reason,"which is holistic thinking. People that say that phrase are implying that whatever event or inconvenience they just experienced is relevant to their bigger picture whether it be a long-term goal or just life.
In my first example, the "big picture" or "complex whole" includes the charm bracelet, the memories it evokes, and all the emotions it makes me feel. Without the bracelet, I can not remember that specific memory, and without the memory, I can not feel any of the positive emotions mentioned. Each thing is dependent on the other which is what makes it a whole or a system. Artful objects are associated with the right brain, specifically holistic thinking, because they are created with the intention of triggering an emotional response. Most objects are also created due to an emotional response in their creators. Paul Gauguin's *Spirit of the Dead Watching* was inspired by Edouard Manet's *Olympia*, and Edouard Manet's *Olympia* was inspired by Titan's *Venus of Urbino*. Without one, we may not have the others. Holistic thinking is everywhere—there's no telling how many artful objects exist because of it, and most people don't even realize it.

8. 10:45 **u COFFEE MUG DESIGN. *Alyssa Hatcher*, Auburn University.

For me, drinking coffee in the morning is more than just a way to wake up. It's a ritual, something I do each day that allows me to just sit in the quiet of the morning and mentally prepare myself for the day ahead. As a coffee enthusiast, I also have a bit of a passion for collecting mugs. It wasn't until I purchased a mug for this assignment, however, that I really started to think critically about mugs as designed objects. The purchased mug in question seemed more like an engineered object at first glance, a simple, off-white vessel used to hold caffeinated beverages. Upon closer inspection, however, I started to notice artful little details and subtle changes in the shape of the mug that transformed it into the form of an elephant. It was then that this mug became more than a practical object. Suddenly, it had an artful value that an engineered object just couldn't have. It became the middle ground between an object made solely for practical reasons and one made for its intrinsic artful value. In a similar way, the corpus callosum is used to both design and enjoy the design of this mug, so the corpus callosum, is, quite literally, the middle ground between the analytical (left) and intuitive (right) sides of the

mind. The corpus callosum sends signals from each side of the brain to the other side, allowing someone to holistically experience the design of a mug.

9. 11:00 **u THE DUALITY OF A MERE PEN. *Jordan Mercure*, Auburn University.

What is a pen? A hunk of plastic that can transfer ink to paper? A gateway to dreams and the imagination to be transferred to thousands? Often pens are designed to simply transfer ink to the papers, and yet this pen, a Pilot Razor Point, seems to evoke beauty in its curves,simplicity, and its retrospective packaging design. What sets this pen's nature of form and function apart from a bulk order pen that lacks such beauty? In function, this pen is designed to draw sharp lines quickly that dry fast and in high detail. Unlike a ballpoint pen, this is a marker-based setup that is built to override the bleeding effect that can be caused by traditional rolling ink-based pens. This functional pen evokes a beautiful efficiency inside its functionality that exemplifies it as a writing utensil. The art design is simple, but it can also evoke an impression of effectiveness with minimalistic beauty. The sharp angles on the lettering, as well as it's metallic coloring, speak volumes to the fine details this pen can etch as well as to sensationalize its quality. The rounded yellow tip makes it identifiable like a signature to any who would recognize it in a cup or from a distance. The seemingly bleak gray exterior, at closer scrutiny, even contains metallic flecks giving it more unique qualities and thus, reinforcing its minimalistic beauty. The box uses this established minimalistic efficiency and reinforces the idea of grandeur in utilization of retrospective advertising to show its lasting cultural effect, the quality, and even using the red and white to snag attention. Yet with its adherence to a classic packaging style, it lends extravagance to such details without overwhelming the consumer who is looking for a quality product. Overall, this Pilot Razor Point pen exemplifies the idea of union between engineered and artistic measures, encapsulating the proper design that can stimulate this idea of harmony between both sides of the human mind.

10. 11:15 **u THE LEFT HEMISPHERE AND THE LEAD HOLDER. *Julia Whitt*, Auburn University.

The human brain is an intricate system of connections and traits that influence our everyday actions. The different hemispheres of the brain, the left and right, can also be related to how and what humans create and for what purpose. These two sections of the brain, though seemingly opposite, are connected by more than just the corpus callosum, which mediates and transfers information between the two sides. As a pre-architecture student, I spend most of my time creating and therefore, am going to explore the connection between the left hemisphere and my engineered object, and how they help me create which is a right brain characteristic.

An engineered object is designed to be purely functional with no attention paid to aesthetic. As a result, I choose a lead holder refill, a plastic tube with lead sticks inside, with no ornamentation on the package. This engineered object is intriguing because it may be completely utilitarian, but it is used to make something meaningful, which is a characteristic typically associated with the right brain. In contrast to the right, the left hemisphere is analytical, logical, and controls the

right side's motor skills, including writing and drawing. Therefore, the left hemisphere is mostly enacted to create this engineered object, but it is crucial in designing something the right brain will appreciate and identify with.
When using my engineered object in my major, I am using a left brain designed object and my left brain in order to draft because it requires logic; I am also using my right-sided motor skills because I am right-handed. Only after using the left hemisphere is the information translated through the corpus callous into the right hemisphere, which assists in assessing artistically and emotionally what I have created. Therefore, the stereotype that the left brain and right brain are completely separate and have drastically separate traits is false because they are in fact complimentary: one cannot perform without the other, as seen in how they are connected through the creation and performance of my engineered object. Therefore, my lead holder refill is crucial in designing something the right brain will appreciate and identify with.

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SECTION X. BIOETHICS AND HISTORY & PHILOSOPHY OF SCIENCE
Paper Session II
Thursday Afternoon, 1:00 – 3:00 pm
Arthur J. Bond Engineering Building, Room 101
Clark Lundell, Presiding

11. 1:00 **u SCENTED SOAP PETALS: A FLORAL BOQUET. *Anna Leach*, Auburn University.

Designed objects take the best of what each brain hemisphere has to offer, combining the left brain's utility with the right brain's appeal to aesthetic value and emotion, in order to create objects (both large and small) that fulfill their purpose with an element of spectacle that is alluring to the consumer. A designed object embodies the corpus callosum by appealing to both hemispheres of the brain. The appearance and fragrance of the scented rose petal soap makes it one such object that targets the callosum due to its major role in transferring and processing sensory information. Soap was originally considered an engineered object meant for cleansing the body, but since its invention, designers have continually improved upon it. That process led to products like scented soaps. Instead of simply creating a bar of soap, the designers of this product wanted the consumer to feel pampered and special as they used it. Soap was carefully molded into the likeness of a rose and infused with its scent. The rose's association with love and beauty subconsciously fills the consumers' mind whenever they see or smell one. Finally, its packaging reinforces these ideas. Metallic bands catch the light, drawing in the eye; and it's clear front and soft, yellow sides allow the

meticulously crafted petals to be fully seen and admired. The name of the company is Body Luxuries, which is the exact feeling they wish for the consumer to desire.

12. 1:15 **u GLASS BLOWN ORNAMENT. *Lilly Echeverri, Auburn University*

An artistic object is a designed object meant to evoke emotions in a personal or general manner, but it could also be made simply for aesthetic reasons. In simpler words, people enjoy artistic items because they are either pretty or the object means something to them, or even better, the objects are both pretty and sentimental. The object I chose is both to me. It is a hand-blown glass ornament. The reason I believe this is an artistic object is because artistic objects can have a lot of value placed on them, and handmade glass is becoming more and more valuable everyday with the possible lack of glass materials in the future. The actual act of making glass by hand uses the right hemisphere of your brain because glass making involves the abilities to see and produce a 3D object all in one go by heating, blowing, shaping and repeating until the artist is happy with the outcome. This is a skill not many have unless they are right-brain dominant, or it can be more difficult to envision what one is trying to make since it starts off as almost a sort of fiery blob before they mold it. Because it is difficult and not a common trade, there is even more value placed on handmade glass. The object I brought in is from the J&M Bookstore in their local market section made by a woman named Laura Bronson. The reason glass ornaments mean so much to me is because they make me think of my mom. Last summer (the summer before my first semester of college and being away) we watched the Netflix series called *Blown Away*. We fell in love with the act of glassblowing. I have a huge appreciation for that art form, and I hope to work with it one day for my own artistic enjoyment as a creative outlet while also getting a chance to use my right brain hemisphere.

13. 1:30 **u THERMOMETER. *William Rath,* Auburn University.

The left side of the brain helps us think about many things; mathematics, writing, analytical, logical, and reasoning skills all come from thinking. The left side of the brain is crucial to us. While the right side of the brain gives us creativity, the left side of our brain helps us with things like academics. The left side of our brain is so important to us because it helps carry us on our career paths. Like the left side of our brain, thermometers are essential too. A thermometer is an engineered object that helps us figure out what our body temperature is. This is important because we need to know whether or not we are sick which can save our lives. A thermometer is an engineered object because it consists of movement and rotation. When a thermometer needs new batteries, one simply slides the back of the thermometer up, and the back comes off. Once the batteries are in, all one has to do is slide it back on. A thermometer, like the left side of our brain, thinks on its own. All it needs is for us to place it in our mouth, and it will magically come up with the temperature. A thermometer, like the left side of our brain, has skills that are extremely crucial to us. A thermometer has many similarities with the left side of our brain, and that is why it is fascinating.

14. 1:45 **u OTTO THE OTTER. *Elizabeth Lowman*, Clark Lundell, Auburn University.

The holidays are always the time when parents are most vulnerable to the advanced psychology of marketing strategies. My dad is no exception. Let me elaborate. For Christmas 2017, I was given Otto the Otter. Otto is an otter figurine that doubles as a tape dispenser. Otto is the perfect example of a designed object. What sets a designed object apart from other objects is that it incorporates both the form of an artful object and the function of an engineered object. The form and function of this object resonates in both parts of a human's brain. The right side, which controls creativity, admires the realistic depiction of the otter shape; and the left side, which controls logic, admires that is a useful object in an office or work setting. In addition to the right side and the left side being activated, the corpus callosum is also activated by this object because it controls movement between the two sides. To seal the deal, Otto came in a yellow box that said, "Happiness, optimism, a grateful daughter." I can see why my dad had to buy this object for his daughter when I take into consideration that the three parts of his brain were drawn to this unique object and its packaging. Well, luckily for my dad, my brain had the same reaction his did to the object. I am grateful that Otto is my tape dispenser.

15. 2:00 **u SMALL DIFFERENCES MAKE A LARGE IMPACT. *Morgan Slone*, Clark Lundell, Auburn University.

Imagine two seemingly identical lemon squeezers: one bright yellow with ridges mimicking the inside of a lemon and holes shaped like lemon seeds, and one metal without ridges or seed-shaped holes. The two squeezers are the same price, so a decent percentage of people would opt for the first one because of greater appeal. That is what engineered objects, like the metal squeezer, lack: aesthetic appeal. Engineered objects pay little attention to aesthetics because design elements and principles were not taken into consideration. In this case, there was no appeal of color, which is a quintessential design element; therefore, the metal squeezer was left appearing plain. Color is perceived by most literate adults in the left-brain, which is the dominant side in decision making. According to Satyendra Singh, about 62-90% of assessments are based on color alone. Additionally, the concept of perceived appropriateness plays a crucial role in a product is purchased. This argument is based on whether the colors of a brand logo "fits" that brand, according to a study by Cardiff Business School, but it can be applied to any object's color. Therefore, this lack of attention to psychological factors could hinder the profitability of the metal squeezer.
Engineered objects can also lack usability because they are not as connected with the human interface. The two lemon squeezers may not appear different, but the results of the one with ridges are better than the one without. The first lemon squeezer provides purely functional use with little regard to usability.

16. 2:15 **u RAINING LOTUS: AN ARTFUL OBJECT. *Logan French*, Clark Lundell, Auburn University.

What makes an object art? According to Socrates' in *The Republic* by *Plato*, arts are just a form of copying; undermines the differences in media, and an artist

merely reproduces forms mirrored from nature. In contrast to Socrates' left-brain logic, Aristotle's holistic thinking of the right side of the brain argued that mimetic arts are skillful renderings that emphasize the differences in media because they are important to understanding art. Tolstoy's critical "Theory of Beauty and Taste", the modern approach to the question "What is Art?" answers that: beauty is subjective: there is no one definition of art; and art promotes class inequality. He believes that art infects the audience with emotion. Art communicates in a unique way that is essential to human life. When discussing art, the word "aesthetics" is typically brought up. According to another philosopher named Berys Gaut, the definition of aesthetics includes moral evaluations. In art, aesthetics should be mentioned broadly because in the narrow sense, it only concerns beauty. The object that I chose, to represent an artful object, is a plastic, plug-in, mini water fountain shaped like a lotus. The fountain was designed to allow the customer to enjoy the relaxing sounds of water in his or her home. This is an artful object because it was created to mimic the memory and sound of running water with an aesthetic image of a lotus flower.

17. 2:30 **u SORORITY BADGE: MORE THAN JUST A PRETTY BADGE. *Chloe Cory*, Auburn University.

When people think of sororities, they probably think of southern girls, extravagant houses, and parties. These assumptions do not encompass all Greek life, just a part. Being assigned to write about an artful object, I thought about the definition. The item is supposed to evoke emotion, memory, or be aestheticly pleasing; and my sorority badge does just that. When I see my badge, I think of when I got initiated, all the symbolism that went into that ritualistic ceremony, and how much it meant to me. Now when I wear it, I get to show pride in my sorority and Greek life as a whole. This applies to how the right brain works. The right brain is in charge of artistic thoughts and the way people do things. This is best said by those who are more rightbrain inclined that see the whole picture before the small details. This ties in directly with my badge. When someone sees it, they can tell that I am in Greek life; but to know which sorority I am in, they need to pay attention to its individual characteristics.

18. 2:45 **u LEFT BRAIN, RIGHT BRAIN... FELLOWS. *Tanner Harden,* Auburn University.

Designed objects develop as a result of the necessity of functionality mixed with the desire for beauty. When humans interact with an object, they are experiencing it with both sides of their brain. The left hemisphere focuses on the practical nature of the object; how it works; what it does; what it is called; and how to use it. The right hemisphere appreciates designed objects for more abstract reasons. It is the side of the brain that houses imagination and creativity; and it appreciates art. The corpus callosum lies in the middle of the two hemispheres and acts as a connector, which allows information to pass between the two sides of the brain. The Fellow Stagg EKG Electric Kettle is a prime example of a designed object. The designers at Fellow Stagg strive to create the most beautiful, purposeful products: "Simple Aesthetic. Powerful Design." They do not compromise functionality for aesthetic beauty; they integrate the two. The body is minimal and

sleek to be like art; but it is also optimized for smooth and precise pouring. The base also appears simple, to accompany the sophisticated look of the kettle, but it is loaded with features; it controls the temperature, has a built-in timer, and can hold a desired temperature for up to an hour. The Fellow Stagg EKG is a successful product because it is a designed object, made with creativity, research, and intention. Maximized for efficiency and beauty, it appeals to both sides of the human brain. Combining practicality and delight, the designers carefully considered the most useful functions and integrated them into a stunning, minimal casing.

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SECTION X. BIOETHICS AND HISTORY & PHILOSOPHY OF SCIENCE

Poster Session
Thursday Afternoon
Arthur J. Bond Engineering Building, Room 101
Authors Set-up: Begins at 3:00 pm
Authors Present 3:15 – 4:00 pm, viewing and judging
James Bradley, Presiding

19. BIOETHICAL ISSUES IMPLICATED IN GEROSCIENCE RESEARCH. *Shuntele Burns*, Alabama State University.

The field of Geroscience has the potential to extend human life beyond its current limits. However, prolonging life span raises ethical issues that should be of concern not only to the scientific and medical communities but also to the global community in general. As humans age, they are more susceptible to certain diseases. Geroscience focuses on the age-based biological processes, seeking to target the molecular and cellular progressions that lead to age-related illnesses. These include genomic instability, telomere attrition, and cell senescence; and researchers are currently developing technologies, therapies, and drugs to manipulate some of these aging hallmarks, thereby postponing some diseases. If the onset of disease is delayed, life span will likely increase, but these manipulations and the resulting longer life span could be problematic. The long-term side effects of anti-aging interventions are unknown. Even if these procedures are found to be safe, a sharp rise in the elderly demographic could exacerbate population problems, increase health care costs, and unfairly burden the young and middle-aged. Furthermore, given the inequalities within and among societies and countries and the fact that life-extending interventions will not be equally available to all, is it ethical for researchers to focus on expanding life expectancy for those who already live longer, thereby increasing the disparities between rich and poor individuals and societies? Scientific efforts that may result in increased human life span beyond practical limits require thoughtful consideration of the ethical issues surrounding these pursuits.

20. TYPOGRAPHIC READABILITY INDEX. *Wei Wang,* Auburn University.

Readability is defined as the ease with which a reader can understand a written text. Low color contrast and small type (LCCST) on print materials have the potential to cause issues in readability, comprehension, and communication among consumers, especially in those with vision impairment. Often, graphic designers fail to keep these audiences and aspects in mind when creating designs due to modern design practices, aesthetics, and education. We surveyed over one hundred U.S. consumers and asked the participants to rate the readability of a variety of print materials one at a time, on a scale of 1 to 5, from "Very Easy to Read" to "Extremely Difficult or Impossible to Read". Through data analysis, we discovered that the Typographic Readability Index (TRI) is a reliable measurement used by designers to predict the level of readability in print materials. With consideration of font size, font weight, font proportion, letter spacing and color contrast ratio as its main factors, the TRI can be calculated and used as a reliable predictor on how readable the text will be for the general population.

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