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Authors

Jeste, Dilip V
Lee, Ellen E
Cassidy, Charles
et al.

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THE NEW SCIENCE OF PRACTICAL WISDOM

**DILIP V. JESTE,* ELLEN E. LEE,* CHARLES CASSIDY,† RACHEL
CASPARI,‡ PASCAL GAGNEUX,* DANIELLE GLORIOSO,* BRUCE L.
MILLER,§ KATERINA SEMENDEFERI,* CANDACE VOGLER,|| HOWARD
NUSBAUM,|| AND DAN BLAZER¶**

ABSTRACT Wisdom has been discussed for centuries in religious and philosophical texts. It is often viewed as a fuzzy psychological construct analogous to consciousness, stress, and resilience. This essay provides an understanding of wisdom as a scientific construct, based on empirical research starting in the 1970s. The focus is on practical rather than theoretical wisdom. While there are different conceptualizations of wisdom, it is best defined as a complex human characteristic or trait with specific components: social decision-making, emotional regulation, prosocial behavior (such as empathy and compassion), self-reflection, acceptance of uncertainty, decisiveness, and spirituality. These psychological processes involve the fronto-limbic circuitry. Wisdom

*University of California–San Diego.

†Evidence-Based Wisdom, London.

‡Central Michigan University, Mount Pleasant, MI.

§University of California–San Francisco.

||University of Chicago.

¶Duke University, Durham, NC.

Correspondence: Dilip V. Jeste, M.D., University of California San Diego, 9500 Gilman Drive, #0664, La Jolla, CA 92093.

Email: djeste@ucsd.edu.

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is associated with positive life outcomes including better health, well-being, happiness, life satisfaction, and resilience. Wisdom tends to increase with active aging, facilitating a contribution of wise grandparents to promoting fitness of younger kin. Despite the loss of their own fertility and physical health, older adults help enhance their children's and grandchildren's well-being, health, longevity, and fertility—the “grandmother hypothesis” of wisdom. Wisdom has important implications at individual and societal levels and is a major contributor to human thriving. We need to place a greater emphasis on promoting wisdom through our educational systems from elementary to professional schools.

We are drowning in information, while starving for wisdom.

—E. O. Wilson (1999)

ARE THE SMARTEST PEOPLE ALSO THE wisest? Not necessarily. While traditional intellectual reasoning and procedural knowledge have helped build the communities we live in, there is a growing scientific understanding that we need emotionally balanced and better-fitting prosocial frameworks for coping with the uncertainties and complexities of life and addressing new challenges of the modern world. We are now poised on the edge of a new science of wisdom.

The concept of wisdom, long considered the “pinnacle of insight into the human condition” (Baltes and Staudinger 2000), has been that of an intangible, subjective, culturally specific entity—an unscientific construct, perhaps best reserved for abstract religious and philosophical discussions. Now consider the modern world in which we find ourselves—diverse, uncertain, polarized, rapidly changing. It is no surprise there is increasing interest in the tantalizing promises of a scientifically based, supple, and powerful concept like wisdom. When we face real-life decisions, how do we integrate a broad range of perspectives? How do we balance intelligence with emotion? How do we navigate uncertainty with limited information, and how do we find solutions that can meet society's needs? Mighty challenges, but challenges to which some scientists are beginning to rise. This essay aims to introduce the new science of wisdom research to the broader scientific community.

Humans have been driven to bottle and pass on wisdom since the earliest civilizations emerged, and almost certainly long before that, just without written records. The Bhagavad Gita, a Hindu text dating from around 500 BCE (based on the Yogas, which date back a couple of millennia BCE) discusses wisdom at great length. Ancient Greek philosophers, or “lovers of wisdom,” also highly prized the construct, with Socrates finally accepting the Oracle at Delphi's declaration that there was no one wiser than him, with the words “I am the wisest man alive, for I know one thing, and that is that I know nothing.” The Bible contains the Books of Wisdom (Job, Psalms, Proverbs, Ecclesiastes, Song of Solomon). However, empirical wisdom research didn't begin until the 1970s, with pioneering work by Vivian Clayton at the University of Southern California in Los Angeles and Paul Baltes at the Max Planck Institute for Human Development in Ber-

lin. Important contributions to the field also emerged from Harvard University's groundbreaking Grant Study, led by George Vaillant (2002).

Following a path taken by similar scientific constructs once considered rather fuzzy, such as consciousness, resilience, stress, and well-being, wisdom is making the journey from vague abstraction to an empirically grounded concept of human ability. With an aging population, a greater plurality of life options, and the availability of more sophisticated psychological, behavioral, and neurobiological measurement tools, a robust scientific study of wisdom is beginning to take shape.

DEFINING WISDOM

Before specifying a definition of wisdom, it is worth highlighting a key distinction between “theoretical wisdom,” which pertains to understanding the deep nature of reality and humans' place in it, and a more everyday, grounded “practical wisdom,” which is more akin to making good decisions—doing the right thing, at the right time, for the right reasons. (For an early analysis of this distinction, see Aristotle's *Nicomachean Ethics*.) It is the “practical wisdom” on which researchers have primarily focused their empirical efforts.

Practical wisdom has been variously conceptualized as a set of skills, a process of making wise decisions, a comprehensive body of knowledge, high intelligence guided by moral virtues, and even as a social characteristic. Wisdom is perhaps best defined as a uniquely human ability or trait that includes several specific components: social decision-making, emotional regulation, prosocial behavior that is guided by capacities such as empathy and compassion, self-reflection, acceptance of uncertainty, decisiveness, and spirituality. An important element of practical wisdom is excellence of character and habits.

An argument against conceptualizing wisdom as a personality trait is that, while a person might mobilize the process of wise decision-making for a particular decision in a particular domain of experience, they may not do so in all domains. Nonetheless, there are certain figures whom survey respondents frequently cite as wise—Mother Teresa, Nelson Mandela, Mahatma Gandhi—while very few would describe Adolf Hitler or Benito Mussolini in the same way. This consensus suggests that some individuals are far more likely than others to be considered as makers of wise decisions. Thus, wise decision-making is generally thought of as taking place across domains and situations, suggesting that wisdom can be justifiably described as a personality characteristic or trait.

MEASURING WISDOM

The task of measuring wisdom is not simple. Often the very proposition of measuring wisdom can raise eyebrows and trigger responses such as “Wise according to whom?” Wisdom is a psychological construct, and thus measuring it entails

many of the challenges associated with measuring other psychological constructs such as extraversion or agreeableness. Currently, measuring wisdom has been approached in several ways, from self-reporting to solving certain kinds of problems, and as with any kind of measure, there are complexities involved.

Psychological constructs are often assessed through the use of self-report scales. While most such scales are neither time-consuming nor effortful to complete and can be administered by nonexperts, they do have limitations. Inflated or diminished self-esteem means that participants are often not the best judges of their own competencies. Also, social desirability bias can motivate respondents to present themselves as being more virtuous than they really are. Consequently, wise people may judge themselves more realistically than unwise people, leading to harsher self-reported ratings than those claimed by their less wise counterparts. Despite these limitations, self-report measures do have value. In cases where it has been possible to collect both subjective and objective measures of the same or similar constructs, objective scores correlate surprisingly well with self-report scale ratings (Oswald and Wu 2010).

Three wisdom measurements commonly used in empirical research, all self-report scales with good psychometric properties, are

1. The Three-Dimensional Wisdom Scale (3D-WS), which covers three proposed components of wisdom: cognitive, reflective, and affective/compassionate (Ardelt 2004);
2. The Self-Assessed Wisdom Scale (SAWS), which reflects five proposed dimensions of wisdom: humor, emotional regulation, reminiscence/reflectiveness, openness to experience, and critical life experiences (Webster 2003); and
3. The San Diego Wisdom Scale (SD-WISE), which reflects six commonly identified components of wisdom: prosocial behaviors, social decision-making, self-reflection, emotional regulation, decisiveness, and acceptance of uncertainty. The SD-WISE is distinct from other wisdom measurements in having a putative neurobiological basis: its six components share a common neurocircuitry, comprised of the prefrontal cortex (dorsolateral, ventromedial, and anterior cingulate) and the amygdala (Thomas et al. 2017).

Beyond self-report scales, other wisdom measurements include a “performance-based” approach called the Berlin Wisdom Paradigm, which characterizes wisdom as “expertise in the fundamental pragmatics of life” (Baltes and Staudinger 2000). Participants are asked to respond to vignettes about ambiguous moral dilemmas, such as a 15-year-old girl wanting to get married. The Situated Wise Reasoning Scale (SWIS) focuses on “wise reasoning,” entailing intellectual humility, recognition of a world in flux and change, appreciation of different perspectives, application of an outsider’s vantage point, and consideration of and search for compromise and conflict resolution (Brienza et al. 2017).

A comprehensive assessment of wisdom may need to use several different measures. Ideally, accurate assessment of an individual's level of wisdom may warrant monitoring that person's behavior continuously for weeks, and then analyzing it using machine learning and artificial intelligence processes to identify patterns of responses, although such a procedure would currently be considered impractical and arguably unethical. Furthermore, there is often no gold standard for defining specific behavior as wise or unwise in varied contexts.

THE BIOLOGY OF WISDOM

In recent years, wisdom science has begun to focus on the biological processes that are intrinsically part of any psychological capacity. Researchers are tackling new questions such as “What is happening in the brain when we make wise decisions?”

The attempted mapping of a biological terrain for wisdom could be perceived as problematic. We believe that our biology is not the destiny or an obstacle but an opportunity; by securing a greater understanding of the physiology underpinning wise behavior, novel wisdom-enhancing interventions might be developed, increasing such capacities for all of us.

A Putative Model of the Neurobiology of Wisdom

Charting a neurological map for a behavior as complex as wisdom is a considerable challenge. Any such model is necessarily oversimplified and most likely incomplete. A putative model of neurobiology of wisdom has been proposed, based on a review of the neurobiological associations of individual components of wisdom along with frontotemporal dementia (FTD) and case reports of trauma-induced loss of wisdom (Jeste and Lee, 2019; Meeks and Jeste 2009).

The degenerative brain disease FTD is revealing for wisdom research. Rather than attempting to catch a glimpse of the wise brain “in action,” scientists working with FTD patients are provided with a painful but instructive “inverse natural experiment” in the form of a focally damaged brain that is no longer capable of wisdom. For FTD patients, portions of the frontal and anterior parts of the temporal lobes atrophy (Warren, Rohrer, and Rossor 2013). Patients who were once empathic have trouble recognizing emotions in others, and the facial mimicry essential for making sense of others' emotions becomes severely impaired (Goodkind et al. 2015; Marshall et al. 2018). Patients also become much less prosocial, both in terms of sharing resources with others and of helping others in need (Sturm et al. 2017).

There are also a number of case histories of patients who suffered brain injuries through accidents, which detail damaged areas and the associated changes in behavior. The most famous of these “experiments of nature” is the 19th century's Phineas Gage, both of whose frontal lobes (especially the left) were severely dam-

aged when an iron rod entered his skull as a result of an accident at work. Gage was transformed from a considerate and dependable man into an antisocial and volatile character, even though he was otherwise largely unaffected physically and cognitively (Haas 2001). Several similar cases, linking damaged brain areas and associated symptoms, have been documented over the course of the last century. This body of literature argues for the inclusion of the prefrontal cortex (PFC) and the limbic striatum—in other words, fronto-limbic neural substrates—in a model of putative neurocircuitry of wisdom.

Charting the Evolution of the Wise Brain

Ever since the Swedish Botanist Carl Linnaeus introduced the label in the late 18th century, human beings have borne the rather weighty scientific title of *Homo sapiens*, or “wise man.” Within this name is preserved an unspoken assumption that wisdom is exclusively a human attribute. The tools of evolutionary neuroscience allow us to tackle new questions and challenge old assumptions—“When do we see wisdom-enabling biological features emerge in our evolutionary history?” and “If our great ape cousins share some of these features, might they share some of our wise capacities too?”

Many real-world competencies, such as planning, judgment, and initiation, rely heavily on the brain’s fronto-limbic circuitry (Meeks and Jeste 2009; Thomas et al. 2019), which includes the dorsolateral and ventromedial prefrontal cortex (PFC), orbitofrontal cortex (OFC), anterior insula, amygdala, and nucleus accumbens. So, do we observe significant changes in this circuitry during the 7-million-year period that has passed since humans parted ways with the last common ancestor we share with the great apes?

Within the evolving ape brain, there have indeed been important structural changes in the machinery governing wise behavior since this point of departure, including changes in the amygdala, size of the PFC (specifically Brodmann Area 10) relative to other regions within the frontal lobes, an increase in relative size of the OFC, and some reorganization of the striatum (medial caudate) and ventromedial frontal cortex (Barger et al. 2014; Semendeferi et al. 2002; Teffer and Semendeferi 2012). Another evolutionary change has been the expansion of von Economo neurons in the anterior insula and anterior cingulate. These large bipolar neurons reportedly facilitate decision-making linked to emotion. The many similarities in brain biology suggest that such apes may be capable of demonstrating some level of wisdom. The critical differences, however, indicate that our human capacity for wisdom has evolved beyond the abilities of our ape ancestors and living ape cousins.

The label of *Homo sapiens*—“wise man”—seems justified, although an evolutionary neuroscientist might suggest the name *Homo sapientior*—“the wiser man”—as a more prudent choice.

Grandparent Genes and Population Resilience

The human life course contains at least two periods that are significantly longer than they are in other apes: a lengthy childhood, and a lengthy post-reproductive period. A lengthy childhood seems to provide the benefit of more time for the assimilation of culture. The benefits of an extended old age seem much less clear. Most other animals typically die soon after the end of their fertility, yet humans stubbornly live on for another two or three decades (Croft et al. 2015).

From a rudimentary biological perspective, an extended old age does not seem to fit with what we understand about the gene selection process. Genes are believed to be selected primarily on the basis of the benefit they bring prior to reproduction, even if they are detrimental to the organism in its post-production period—a process known as antagonistic pleiotropy. Post-reproductive benefits—continued health in later life, for example—should be irrelevant.

Unexpected as they might be, such “old-age supporting” genes have indeed been located in the human genome. They are called human Siglecs (Sialic acid-binding Immunoglobulin-related Lectins), and are known more provocatively as “grandparent genes” (Schwarz et al. 2016). They regulate friendly fire in immune system cells (low-grade inflammation associated with aging, or “inflammaging”), and essentially protect the aging human body, including the brain.

So how might these grandparent genes be relevant to the transfer of wisdom across generations? Human beings amass a great deal of valuable knowledge over the course of their lives. With the development of human language, an emerging function that allows humans to generate infinite meaning and share it with others (essentially “tell stories,” or *Homo narrans*), older adults became able to effectively pass on such hard-earned knowledge to their inexperienced younger kin. These insights and life lessons increase the grandchildren’s chances of reaching reproductive age themselves. Through this “once-removed” selection mechanism (known as kin selection), genes that supported longevity could have been selected for, assuming any negative effects earlier in life do not outweigh their positive effects late in life. Hence, geneticists observe “old-mind-supporting grandparent genes” in human DNA. The human genome appears to have baked in a mechanism for the intergenerational transfer of wisdom. (It should be noted that not all culturally and linguistically transferred information is necessarily adaptive, pro-social, or wise.)

The involvement of grandparents in the raising of grandchildren has also been shown to increase the fertility of the grandchildren—a well-documented process known as the “grandmother hypothesis” (Lahdenperä et al. 2004). This increasing fertility, evident even among nonagricultural foraging societies that have shorter birth intervals and earlier weaning than all our closely related ape relatives, suggests that the overall population size will also increase.

Epigenetic factors orchestrate gene expression and silencing, thus regulating pathways through which environmental risk and protective factors influence bi-

ological drivers. Epigenetics is an obvious next step in further exploring the underlying neurobiology of wisdom.

The field of human anthropology can bring another illuminating perspective to bear on the science of wisdom. Why did some early human populations survive when others failed? Did older people actually play a more pivotal role than simply passing on personal wisdom to their own grandchildren? One possible explanation implicates the “resilience” of the different populations as the distinguishing feature. A resilient community is one that endures over a long period of time. Only if a community sustains itself over many successive generations can it facilitate the cumulative development of the sophisticated traditions we associate with collective wisdom. Research indicates that populations with a higher rate of old-to-young people in fact survive for more generations, prior to collapse (Caspari 2018).

The anthropological approach suggests that, while aging at the individual level might not guarantee wisdom, at the population level the presence of older people may be beneficial for making our communities wiser.

WISDOM, CONTEXT, AND CULTURE

Having outlined the case for a stable and complex biological underpinning of wisdom in the previous section, we must reconcile this position with the subtly varying presentations of wisdom observed in different cultures today.

For example, in 2000, a crosscultural study compared Western and Eastern students’ views on wisdom (Takahashi and Bordia 2000). Both groups agreed strongly that wise people are both “experienced” and “aged,” but there was also some stark disagreement. For example, the Eastern students considered the term *discreet* to be strongly associated with wisdom, while the Westerners thought it related weakly. Thus, wisdom is thought about as somewhat different in different cultures. And this presents a puzzle. On one hand, we have the consistency of wisdom suggested to us by biology, and on the other hand we see some inconsistency in how wisdom is viewed across different cultures in the real world.

Evolution provides an instructive metaphor for making sense of this conundrum. Just as evolution is at root a biological process, for humans this process unfolds in, and is in turn influenced by, the culture in which it is taking place. In other words, evolution is grounded in biology but interacts with culture (Dobzhansky 1962). Similarly, wisdom appears to be grounded in biology, but this biology interacts with cultural and environmental effects. While the human biological grounding may be consistent across the species, these secondary effects vary across locations and are formidably pronounced in humans. Consequently, wisdom is perceived with minor differences in different periods of history, in different societies at a single point in history, and even in different communities within a single society.

The Power of the Situation

A 2017 study from Grossmann's lab investigated the influence of context on people's ability to reason wisely. It showed that, when looking at wise reasoning over a nine-day period, there was considerable variability within a single individual. This work raises a question. If our facility for wise reasoning varies to some extent as we move through our daily lives, in what contexts are we at our wisest? In an earlier 2014 study, subjects were asked to respond to a life dilemma not as if it was their problem, but as if it was someone else's problem—a process the research team labelled "self-distancing" (Grossmann and Kross 2014). This alternative framing enabled subjects to propose courses of actions that scored significantly more highly for wisdom than those they proposed when considering the problem as their own. Achieving this necessary distance from one's own perspective is quite a challenge when alone, and it is perhaps more accessible when in the presence of others. Rather than making important decisions in solitude, the research suggests that individuals should look to those around them for support when the wisest of choices is necessary.

Wisdom and the Meaning of Life

It has been suggested that humans find meaning in life when they connect to something larger than themselves, a process known as "self-transcendence." Anthropologists have long pointed out that human culture can be considered as an institution for creating meaning. While one might immediately think of religious or spiritual belief systems in this context, this can also refer to cultural traditions, relationships with other people, or even our sense of the natural world. Our species is over 200,000 years old, making it very likely that wisdom in small-scale, mostly egalitarian, foraging societies long preceded the religious traditions anchored in rather recent writings of pastoralist or agrarian societies, which are all younger than 5,000 years since the development of the oldest writing systems.

This transcending of the self, a shift from thinking only of the "small self" to a wider focus on the "big self," has also been proposed as being an essential feature of wisdom. While the meaning of life will never, of course, be determined through empirical measurement, the interplay of philosophical and psychological perspectives is highly fruitful in this case. Connecting to something larger than ourselves seems critical both to developing wisdom in life and to finding meaning in life itself.

WISDOM AND AGING

Wisdom and aging are inextricably intertwined in the public imagination. Popular mythological icons of wisdom—Yoda from *Star Wars*, Gandalf from *The Lord of the Rings*—are typically in the twilight of their long lives, giving them a perspective from which they can judge and parse the tribulations of their young-

er companions. Some people, however, question the long-held assumption that age necessarily brings wisdom. As Oscar Wilde noted wryly, “With age comes wisdom, but sometimes age comes alone.” Since we have all met on occasion unwise older adults, we would agree that aging alone doesn’t guarantee wisdom.

Older and Happier?

A number of predictable changes occur as the human body ages—primarily, a physical decline. But does this decline in physical health trigger an associated decline in mental health? UC San Diego’s Center for Healthy Aging set out to tackle this question with the launch of the large-scale Successful AGing Evaluation (SAGE). Their 2016 paper reported that, as expected, physical health did decline with age, with cognitive function declining after the age of around 60. However, from the age of 20 up into the 90s, mental well-being seemed to improve in a largely linear fashion (Thomas et al. 2016). Rather unexpectedly, it was participants in their 20s and 30s who suffered the most depression, anxiety, and stress. In terms of mental health, older did indeed mean happier. Furthermore, individuals with higher positivity in their memory recall appear to age more healthily (Kalokerinos et al. 2014).

Laura Carstensen’s (2006) socio-emotional selectivity theory highlights the impact that perceived time horizons have on priorities and well-being. When time is perceived as open-ended, goals that become most highly prioritized are preparatory, focused on gathering information, on experiencing novelty, and on expanding breadth of knowledge. When time is perceived as constrained, goals tend to emphasize feeling states, and the regulation of emotional states to optimize psychological well-being. In fact, when time horizons are manipulated to match (for example, by asking young people to imagine leaving their community to move to a new part of the country), young and old adults behave in a remarkably similar fashion. It seems that it’s not chronological age that determines priorities and hence emotional well-being, but rather it is perceived time horizons.

Wisdom and Adversity: The Tragedy and Opportunity of Trauma

In our shared stories, wisdom is typically earned through meeting and overcoming the herculean trials and tribulations of life. While there may be some truth to this, a team from the University of Toronto recently published research suggesting that this is only part of the story (Weststrate and Glück 2017). Much like the process of aging itself, negative experiences alone seem to provide no guarantee of wisdom.

The data from the Toronto study show that the highest wisdom performers did indeed experience a high number of negative events. However, there was another essential step. Following such challenges, these participants chose to reflect on their experiences in a particular manner that the researchers came to label

“exploratory processing,” mining the difficult experience for valuable lessons. The low wisdom performers, however, were “redemptive processors,” avoiding analysis of negative events directly, instead focusing efforts on restoring their emotional well-being. They sought comfort over insight.

As might be expected, exploratory processors were shown to be better than redemptive processors at turning negative events into wisdom gains. This is consistent with the role of self-reflection as an essential component of wisdom, as mentioned earlier. A recent study involving qualitative interviews of older adults in hospice care illustrated how the diagnosis of a terminal illness led to greater self-reflection, emotional regulation, and pro-social behaviors (Montross-Thomas et al. 2018).

Severe adversities such as those associated with serious illnesses are not necessarily a barrier to wisdom. A third of a sample of people with chronic schizophrenia had levels of wisdom similar to those in healthy subjects, and these higher levels were associated with better everyday functioning in schizophrenia (Van Patten et al. 2019).

Wisdom-Related Neuroplasticity of Aging

When reviewing the relationship between aging and wisdom, it is worth considering how the biological machinery of wisdom changes over the life course. From a peek under the neural hood, does the aging process result in a tuning of the engine, or a rusting of the gears?

In this respect, neurodevelopmental trajectories may be pertinent both in youth and in older age. Reward motivation and emotional circuits develop faster than prefrontal control circuits, resulting in greater emotional reactivity, reward-seeking behaviors, impulsivity, and risk-taking in youth, with subsequent reductions in such activities with enhancement of prefrontal inhibitory control, leading to a higher level of practical wisdom.

In terms of aging-related brain changes, Fred Gage and colleagues reported that in old mice, if there is appropriate physical and cognitive activity, not only can synaptic connections be increased, but also in some brain regions new neurons can grow (Muotri et al. 2009). While such neuroplasticity is observed most frequently in the developing brain, such changes have been shown to continue into adulthood and even into old age (Gage 2002). This suggests that while there is considerable degeneration and associated cognitive decline in the aging brain, there are also significant compensatory processes as well as regeneration and growth, laying down the pathways for a range of age-related improvements in cognition. Although debated (Kempermann et al. 2018), there is good evidence for adult neurogenesis (Gould 2007). There is reasonable acceptance of hippocampal neurogenesis in adults (although the maximum age for this is not established), while prefrontal cortical neurogenesis is more debatable.

In terms of an increased capacity for wisdom, there are two relevant developments observed in aging brains: PASA (Posterior–Anterior Shift in Aging) and HAROLD (Hemispheric Asymmetry Reduction in Older Adults). PASA refers to a generalized shift in neural activity from the back to the front of the brain (Davis et al. 2008)—more specifically, a shift from tasks being handled by the occipital lobes, responsible for processing sensory stimuli, to the PFC, responsible for higher-order cognitive processes. This indicates that although deficits in sensory processing increase with aging, the brain may be bringing online regions highlighted above as being associated with wisdom. Essentially, cognitive and sensory deficits associated with aging may be accompanied by an uptick in the use of the wiser parts of the brain.

HAROLD refers to a lateral shift in processing (Cabeza 2002). In younger people, there is an asymmetry in how the brain manages different tasks, with some tasks being processed in the right hemisphere, and others in the left. As the brain ages, this asymmetry decreases. Tasks that were previously managed by a specialized neural circuit housed in one hemisphere now call on both sides of the brain for processing. While low-performing older adults continue to inefficiently employ the same localized neural circuits they employed in their youth, reorganization of neural networks in high-performing older adults enables them to compensate for age-related neurocognitive decline (Cabeza et al. 2002).

Finally, as the brain ages it also changes in how it responds to emotions (Carstensen et al. 2011). Central to the processing of emotions is the amygdala, and recent research has shown that its sensitivity to emotional stimuli changes across the lifetime. The amygdala in younger people shows heightened activity in response to both positive and negative visual images in comparison with neutral images. In older adults, negative images no longer trigger heightened amygdala activity, but positive images continue to do so (Mather et al. 2004). This age-related “positivity effect” may underlie the calmer and more positive behavior in older age (Mather and Carstensen 2005).

While wisdom is a treasured prize in its own right, there is still a further benefit of working toward wisdom in later life. According to research conducted by Monika Ardelt and others, wisdom is associated with greater subjective well-being in older adults (Ardelt and Edwards 2016). This suggests that while the aging process may well help facilitate the development of wisdom, the resulting wisdom may, in turn, help in navigating the inevitable challenges that all humans face—those of aging and dying well.

WISDOM AND HEALTH

Human health provides a good example of where the ephemeral and rather otherworldly concept of wisdom becomes embodied in flesh and bones. Decisions in health care are often uncertain. A major surgery has only a given percentage

chance of leading to a successful outcome. A medication is known to sometimes lead to certain side effects. For both doctor and patient, the terrain could be risky and the correct path unclear. There are few ironclad guarantees, yet decisions must be made.

While there are many ways in which wisdom might play an important role in the field of health care, the present section of this essay limits itself to discussion of specific areas: decision-making, compassionate treatment, and community-level wisdom.

In recent years, medical practitioners and educators have started to ask, “How might we develop systems that support patients in making better decisions about their general lifestyle or specific procedures? How might training programs be developed that produce wiser physicians, better able to manage the emotional dimensions of a patient’s experience, better able to navigate the fallout of a medical error, better able to step outside the guidelines when the guidelines don’t apply?” In many ways, it is hard to imagine an area of our lives better positioned to benefit from empirical wisdom research than health care. While a detailed discussion is beyond the scope of this essay, there is also a growing interest in the construct of patient-centered and value-based, instead of volume-based, health care.

Some studies suggest that medical students become less compassionate over the period of attending medical school (Chen et al. 2012); however, one study suggests that some aspects of empathy improve in training (Smith, Norman, and Decety 2017). While physicians need to maintain a certain emotional distance from their patients in order to provide the most effective care, compassion should be a central component of medical training, rather than its inevitable casualty.

Encouraging work is already underway in this area. In 2014, Dr. Margaret Plews-Ogan, a professor of medicine at University of Virginia, launched the Phronesis Project (Kobert 2016). Its goal is to foster wisdom in medical students and counteract the negative impacts of the sometimes cynical “hidden curriculum.” Students are given a “longitudinal patient experience,” which entails being assigned to follow an adult patient with an ongoing medical challenge through all four years of medical school. The students build a relationship with their patient, learning to appreciate the complex humanity hidden behind the simplicity of a medical chart. In terms of fostering compassion, Plews-Ogan trains her students to regularly solicit patient stories. She suggests that stories help students see the person, not just the symptoms, and as such, rejuvenated compassion can return to the doctor-patient relationship.

The UK’s Royal College of General Practitioners has a simple motto for the core of the attributes of a wise doctor: “*Cum Scientia Caritas*: Science with Compassion.”

Learning from Other Communities: Centenarians in Cilento

As popularized during recent years under the umbrella title of “blue zones,” there are certain regions on the planet where, on average, people have much longer lives. While the Cilento region in southern Italy is not yet an official blue zone, it has a significantly higher than average number of old-old people, and it has become a recent focus of a collaboration between the University of Rome, La Sapienza, and UC San Diego.

The collaborators aimed to learn more about the psychological traits of these super-agers. In 2018, the researchers published a paper identifying several positive traits of the participants that share more than a passing similarity to wisdom: positivity, working hard, spirituality, a bond with family/religion/land, and a balance between stubbornness and adaptability (decisiveness and acceptance of uncertainty) (Scelzo et al. 2018).

BUILDING WISER SOCIETIES

The scientific study of wisdom to date has entailed multidisciplinary research from the fields of psychology, sociology, neuroscience, medicine, anthropology, evolutionary biology, gerontology, and genetics. What does all this research suggest in terms of practical changes? What changes are necessary to make our societies a little bit wiser?

Wisdom and Compassion Training

Intuitively, wisdom seems to entail a certain amount of hard-earned life experience for which humans must venture beyond the safety of the classroom. However, there remains a strong argument for introducing wisdom-related concepts into a variety of educational and professional training programs. Discussions around the key components of wisdom and the lives of wise role models can encourage students of any age to start thinking about the role of wisdom in their own lives.

Professionals working in the fields of law, teaching, business, and even engineering are called on regularly to grapple with thorny dilemmas in the workplace. Mentoring programs and structured discussions among colleagues, in which the components and structure of wisdom are discussed and explored in the professional context, could nurture wiser work cultures. For example, discussions that normalize uncertainty and ambiguity in decision-making, rather than brushing them aside, may go some way toward avoiding a repeat of catastrophic events like the 2008 financial meltdown.

While such approaches may support the development of the cognitive dimension of wisdom, due attention must also be paid to the compassionate dimension. In recent years, a number of compassion training programs have been developed for schools and organizations, incorporating secular meditation and

mindfulness practices. MindUp, a mindfulness training program for schoolchildren, has trained over 150,000 teachers in 12 countries. The program aims to provide young people with tools to regulate their emotions and empathize with their peers—essential skills for generating the compassion that is central to wise behavior.

The introduction of wisdom-focused learning and compassion training into our educational and professional institutions at every level may prove transformational for our communities. Such structural changes have the potential to nudge us away from being a society primarily focused on personal material gains, and toward becoming a society that recognizes, values, rewards, and ultimately celebrates the virtues of compassion-enriched wisdom.

Using Technology Wisely

New technologies bring with them powers without precedent. It is worth surveying the upgraded new landscape to gain a sense of the dangers and possibilities it affords us. As physicist Stephen Hawking warned, “Our future is a race between the growing power of our technology and the wisdom with which we use it. Let’s make sure wisdom wins.”

First, we should note some concerns about technology. The World Health Organization (WHO) recently classified “gaming disorder” as a mental health condition, and in June 2018, the National Health Service in the UK announced plans to open its first Centre for Internet Disorders (Marsh 2018; WHO 2018). Furthermore, many of our social interactions today are mediated through technological devices. A lack of human touch involved in virtual communication seems problematic, since the associated release of the hormone oxytocin has been reported to be central to building trust between groups of human beings (Kosfeld et al. 2005).

Thankfully, there are many ways in which technology can support wisdom development. Artificial intelligence and machine learning are enabling analysis of medical data on an entirely new scale. Such ambitious investigations require previously impractical amounts of computer processing power, yet potentially promise insights once thought beyond the reach of the scientific community. At the level of the individual, increasingly sophisticated wearable devices such as actigraphs and calorie-tracking apps, enable individuals to collect personalized biometric data in unprecedented detail. When such a deep bank of personal data can be combed and analyzed by artificial intelligence and machine learning processes, researchers may be able to develop highly granular wisdom profiles of individuals—where someone is wise, where someone is not, and where one needs to focus future efforts.

Some researchers are now working to bring these tools to bear on the task of not just wisdom measurement, but also wisdom enhancement. For example, Essential Self Technology has proposed that it has the potential to help people re-

connect to the wisdom of their own bodies for better health outcomes (Melichar 2016). Such devices might not only monitor key biometrics, they might then nudge them in a wiser direction. Thus, imagine a device that not only tracks a person's heart rate but can actually slow it down by changing ambient lighting and sound should it sense that the individual is anxious.

One group of people that may benefit most from new technology is the older population. Communication technologies such as Skype may allow older adults to maintain more personal relationships remotely. While such tech-mediated communication may preclude the release of trust-building hormones mentioned above, such channels may help alleviate isolation and loneliness to a degree. In terms of medical care, remote patient monitoring and telemedicine can go some way toward eliminating barriers between less mobile older patients and their health-care providers.

Technology is ripe to be used in the service of either shallow, unwise deeds or to profound, wise ends. So let us choose wisely.

Gross National Wisdom? Introducing a Wisdom Index

In 1972, the King of Bhutan declared that “Gross National Happiness is more important than Gross National Product.” In 2010, the Bhutan Gross National Happiness (GNH) index was introduced to the world, having been developed by researchers from Oxford University and the Centre for Bhutan Studies. The index has been used by the Bhutanese government to determine policy implementation and social progress ever since.

If new measurement indices can shift our focus from money to happiness, might a similar approach work for encouraging a national focus on wisdom? With a better understanding of the structure of wisdom gained from recent research, the development of such an index may be possible. What components might feed in to such a Wisdom Index? These could include care for the vulnerable, provision of international aid, increased level of economic equality, literacy, equal rights for women and other discriminated groups, and intergenerational activities. Although a Wisdom Index could be challenging to construct, developing a Happiness Index was no mean feat either, yet it has been done (although people may disagree about details). Perhaps it can be done for wisdom too.

As well as potentially enabling the comparison of the wisdom of entire nations, an adapted form of the Wisdom Index could be used to identify “wisdom-friendly” communities. Such accolades could foster spirited public debate around the importance of wisdom, as well as provide inspiration for other “wisdom-aspiring” communities.

Wisdom as a Vaccine Against Three Modern Epidemics

It seems that three modern psychosocial epidemics dominate our communities: Opioid abuse, loneliness, and suicide. In 2017, the US Department of Health

and Human Services (HHS) declared the opioid overdose crisis a public health emergency. A 2015 study revealed that the main reason for opioid abuse was, in fact, pain relief beyond the scope of the original prescription (Lipari, Williams, and Horn 2017).

Modern societies are also facing concerning levels of loneliness. In the US, almost 43 million adults over the age of 45 suffer from chronic loneliness (Holt-Lunstad 2017). In 2018, the situation was considered grave enough in the UK for the government to take the unprecedented step of appointing its first Minister for Loneliness (GOV.UK 2018). Many scientists consider loneliness more a matter of internal interpretation—as a feeling of distress caused by the perception that one’s social needs are not being met (Hawkey and Cacioppo 2010).

Finally, we should consider the alarming increase in suicides in our communities. In the last 17 years, the overall nationwide suicide rate in the US has risen by 25%, increasing among both sexes and all ages, races, and ethnic groups (Stone et al. 2018). There seem to be a number of key drivers, including mental health issues, substance abuse, and personal problems with physical health, relationships, employment, and finances (CDC 2018). Dr. Deborah Stone, lead researcher on a recent report published by the Center for Disease Control and Prevention, commented to the BBC that, for some people, “feeling connected and feeling like they belong are really important things.”

It seems that the epidemics of opioid use, loneliness, and suicide have several characteristics in common, and consequently may respond to similar interventions. Prevention and treatment may be a matter of building certain psychological resources or “vaccines,” and the suite of resources required looks very much like the components of wisdom: emotional control over anxiety or fear, empathy and compassion shifting us from seeing others as a threat, self-reflection, decisiveness amid uncertainty, and spirituality connecting us to a common humanity in which we are welcomed and cherished. Supporting this hypothesis is a recent study that showed a significant inverse correlation between loneliness and wisdom in a community-based sample of 340 adults (Lee et al. 2018).

Wisdom is a tool for our times—a nuanced, flexible, pragmatic, compassionate, and reasoned framework for getting along in the messy world we all share.

A FINAL WORD

The accumulation of scientific knowledge over the last 200 years has led some to refer to the modern period as the “Information Age.” It is necessary for the society to move beyond mere information, and enter a new Age of Wisdom. Recent scientific research suggests that the science of practical wisdom is not a fuzzy construct but rather an empirically based field that is ripe for rapid growth.

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