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**Being Human in the Age of Algorithms:
part 6**

Учебное пособие

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Table of Contents

Preface.....	4
Ballooning life expectancies are upending age-old definitions of life Stages.....	5
Love is like cocaine.....	24
The problem with modern romance is too much choice.....	36
Don't worry, smart machines will take us with them.....	49
Supplementary reading.....	59

PREFACE

Настоящее учебное пособие включает актуальные тексты (2017-2018гг.) учебно-познавательной тематики для студентов механико-математического факультета (направления 02.03.01 «Математика и компьютерные науки», 01.03.02 «Прикладная математика и информатика», 38.03.05 «Бизнес-информатика»).

Целью данного пособия является формирование навыка чтения и перевода научно-популярных текстов, а также развитие устной речи студентов (умение выразить свою точку зрения, дать оценку обсуждаемой проблеме).

Пособие состоит из 5 разделов, рассматривающих значение информационных технологий в современном мире. Каждый из них содержит аутентичные материалы (источники: *Nautilus*, *The Huffington Post*) и упражнения к ним. Раздел “Supplementary reading” служит материалом для расширения словарного запаса и дальнейшего закрепления навыков работы с текстами по специальности.

Пособие может успешно использоваться как для аудиторных занятий, так и для внеаудиторной практики.

1. Ballooning life expectancies are upending age-old definitions of life stages

Part 1

Exercise I.

Say what Russian words help to guess the meaning of the following words: gerontological, political, theorist, futurist, giant, tones, population, medical, epidemiologist

Exercise II.

Make sure you know the following words and word combinations:

Pending, comforting, frailty, sly, malnourished, to strain, unsettling, tantalizing, deftness, detrimental

Ballooning life expectancies are upending age-old definitions of life stages

As our lifespans have increased, so too have our active years. Can that go on?(1)

In 1946 the newly founded Gerontological Society of America cited, in the first article of the first issue of its *Journal of Gerontology*, the need to concern ourselves to add “not more years to life, but more life to years.” Political theorist and futurist Francis Fukuyama was particularly eloquent but hardly alone when he warned two decades ago that if we maintain our obsession with extending life at all costs, society

may “increasingly come to resemble a giant nursing home.” Around the same time noted aging researchers S. Jay Olshansky and Bruce Carnes wrote in ominous tones that we were treading into the realm of “manufactured survival time,” warning that “this success has been accompanied by a rise in frailty and disability in the general population. This is a consequence that neither the medical community nor society was prepared for.” A celebrated article by epidemiologist E.M. Gruenberg in 1977 bemoaned the “failures of success”: “at the same time that persons suffering from chronic diseases are getting an extension of life, they are also getting an extension of disease and disability.” But what if long lifespans don’t necessarily mean more years of disability? The very aged are rare, hence there is unlikely to have been any evolutionary pressure to shape the timing of the end of life, in the way that the timing of early development has been shaped. What we see as the “natural lifespan” is simply a balance between the wear of daily life and the limited ability of repair mechanisms to undo it fully. Shifting the balance, either by increasing the rate or efficiency of repair, or by reducing the rate of damage, must surely stretch out the whole process. Actually, it should do even better than that: The end stage, where most of our suffering is found, ought to be the least susceptible to extension, since it requires maintaining the function of an organism that is failing on multiple levels. This is consistent with the observation that, while mortality rates have been falling at all ages, the pace of progress has been slowest at advanced ages. Youth, according to this argument, should take up a greater portion of our lifespan over time. (2)

A recent study by University of Southern California gerontologist Eileen Crimmins and her colleagues looked at the change

in disability-free life expectancy—the average number of years that we would expect someone to live free of major limitations due to long-term illness. From 1970 to 2016 American males gained about 7.7 years of life expectancy at birth, of which nearly half (3.2) could be expected to be disability free. Perhaps more immediately relevant, Americans aged 65 saw their remaining life expectancy increase from 15 to 19 years, with 2.5 of the 4 extra years being disability-free. (This averages the results for men and women; women gained fewer years overall than men, but the relative gains between disability-free and disabled years are similar.) The largest increase in healthy years after age 65 came in the last decade. Americans in 2010 could expect to live 80 percent of their lives without major disability, including well over half of their years after age 65. Imagine, now, that the trend of the last century continues another hundred years: Our 50-year-old great-grandchildren may have an average of 50 years left to live, the same span as a 30-year-old today can expect. It is not implausible that they will be similarly spry and untouched by disability. Will they really think of themselves as young, in the same way that a 30-year-old today does? Will youth extended still be youth? It is not as absurd as it may seem. On the other hand, the story of morbidity compression could be about to change. Medical technology will continue to advance, but, for all its marvels, it has played a smaller role in compression than basic improvements in nutrition and hygiene. It turns out that much of what might have been considered normal age-related decline is strongly accelerated by disease and malnutrition early in life, even before birth. Babies of malnourished mothers, even those who received adequate nutrition after birth, are

found decades later to have substantially elevated incidences of heart disease. Survivors of childhood smallpox have generally higher levels of mortality in old age. It seems clear that the wealthy part of the world has achieved the peak of benefits to be gained from increased nutrition and basic hygiene—if we have not actually gone far past on both scores. The nexus between improved nutrition and improved adult and late-life health was marked, in the past, by increasing height: Final adult height summarizes the whole record of childhood health nutrition, and the past two centuries of increased lifespans consistently tracked increases in average height. The massive benefits from vaccination, reduction of smoking are still making their way through the aging population, of course, and will likely be stretching our healthy lifespans for some time to come. Tremendous progress could still be achieved by spreading the healthful environments of wealthy countries to the rest of the world, and the healthful lifestyles of the wealthy within those countries to the rest of the population. (3)

But beyond these effects, and especially for Western countries, morbidity compression will not be what it once was. Perhaps the most optimistic scenario for the near future of healthy aging may be what demographer Kenneth Manton has called “dynamic equilibrium.” Manton suggested that disease would not be prevented or delayed, but managed at an early stage, so that an increasing portion of the population would be living with mild disease, while fewer would suffer severe disability. Will the fit 90-year-olds of the future need to expend the strength they have maintained to lug around the contents of a large medicine cabinet to keep them going? An illustration of this may be found in recent study. While the fraction of elderly Americans (age 65

and over) who were taking five or more prescription medications had been increasing, it seems to have stabilized in recent years at just under 40 percent. Many of the most effective treatments for age-related conditions are set-it and forget-it—hip replacements, for instance, and cardiac pacemakers. We long ago got used to thinking that a person can still be youthful and healthy even when needing spectacles to see clearly, or when their survival depends on an artificial supply of insulin. The spry 90-year-olds of the future may be no different, running with leg and heart muscles rebuilt with stem-cell treatments. Whatever the future of aging is, there is no sign yet of any limit to our ability to expand each of the phases of our lives. The division of life into age-based roles like childhood and adulthood, or middle age and old age, is a cultural universal—something found in all known human societies. It can actually be seen in all complex organisms, since each must find some way of balancing the competing demands of growth, reproduction and survival. The American mayfly spends a year growing underwater, then, all within five minutes, takes on its adult form, mates, lays eggs, and dies. An oak tree, on the other hand, spends decades maturing before it begins its annual cycle of acorn-shedding. Despite the differences in speed, life stages are well defined in both cases. We *Homo sapiens* are no exception: our life stages are the biological foundation on which our culture is based. From the Bible to Shakespeare, our stories about ourselves revolve around set stages of our life. They shape almost every aspect of our existence: how we see ourselves and how we see others, our plans and our ambitions, and the social structures through which we move. They also assume one thing:

a natural length of a life. But now that is changing, and quickly. In the developed world, life expectancy has been going up steadily at the rate of two added years every decade. By 2050, average life expectancy in developed countries is likely to be in the mid-80s, and by some calculations, over 90. This trend shows no sign of stopping. Some optimists believe it might even accelerate, and that we could soon attain a state of “medical immortality,” completely immune to sickness and infirmity. We wouldn’t really live forever, as we would still be susceptible to catastrophes like being eaten by sharks or blown to pieces, but we could in theory live a very, very long time. Many, though, seem to find the prospect of such long lives terrible. In a recent survey, over half of Americans thought that extending people’s lives to 120 years would be bad for society, while the overwhelming majority said they themselves would rather die before they reached 100. (4)

For advocates of prolonging lifespans, who dream of a future in which we all frolic merrily into our second century, this is a huge frustration. Some of them simply dismiss the skeptical majority as lacking the imagination to make use of the extra decades, or accuse them of being in thrall to a death cult.⁶ But this underestimates what they are really up against—which is a deeply ingrained idea of what a life should look like, complete with its familiar stages. The question is: how can we adapt our current model of a normal human life without breaking it? According to today’s basic model of life, we get an education, start a career and a family, then, when all that is done, enjoy a happy retirement. But now we are living longer, this model is starting to strain. When pensions were first introduced—by Otto von Bismarck in Germany in 1889—they were for those few who exceeded the 70 years

allotted us by the Bible. In the U.S., pensions were introduced as part of Social Security in 1935, when they were given to those over 65. Life expectancy at the time was 60. Pensions were originally intended to keep a handful of survivors out of extreme poverty—but this began to change in the years of prosperity after World War II. Today the people, who grew up in this time of plenty, take it for granted that they should have a prolonged, leisurely retirement—something previously unknown in human history. With average retirement age in America now at 62 years and life expectancy close to 79, this model is becoming expensive. Already seniors account for over half of welfare spending in the United Kingdom, and approaching half of all federal spending in the U.S. The obvious option is to increase the age of retirement—to at least 70, if not 75, but moves in this direction are so far proving politically unpopular. Increasing the retirement age would also cause other problems, such as fewer jobs available for young people, who already suffer disproportionately from unemployment. Not only would seniors likely have the best positions—the directorships and professorships—but those fields dependent on fresh ideas might stagnate. If, as Max Planck said, science advances one funeral at a time, then postponed funerals means slowed progress. Postponing retirement also means working longer. Some scholars are already talking about the “redistribution of work”—spreading work more evenly across people of different ages. Longer lives, argue the demographers, will mean we need more “life-course flexibility.” It seems crazy that one age group has to simultaneously build a career, raise children and financially support a growing number of older people who do nothing, even though many are willing and able

to work. Therefore they suggest that part-time work should become the norm, both for younger people who might also have child-rearing or educational commitments, and for older people, who are still fit and won't be able to rely on generous pensions for their livelihood. This trend is already visible and a recent British Government report suggests it is set to continue, with, in particular, more men opting for part-time work as they increasingly take on child-care duties. As lifespans become much longer, we might need to take this idea one step further. Instead of a linear progression from education through employment to retirement, we could instead imagine a cyclical approach. Acknowledging that over a long lifespan, our interests and needs will change, we could have repeated phases of training, work and break. A person might expect to have three or four different careers over the course of her long life, with gaps for raising a family, traveling the world or just tending the garden.

(5)

Such a cyclical approach would solve many problems. If everyone, even the most senior, was expected to move on after a set time, then we wouldn't need to worry about the top jobs being hogged by an ageing few. The professor of Greek would step down, and—perhaps after a few years of well-earned rest sailing the Aegean—might retrain as a software engineer. As well as allowing us to explore new interests, such periods of retraining would also ensure our skills did not become redundant. They might also keep our motivation for work high, in a way that the prospect of a century sitting at the same desk might not. This trend too is already underway: One survey estimated that 9 million Americans aged between 44 and 70 are already engaged in second careers, and 31 million more are interested in pursuing one. These

workers are motivated by the desire to stay active, to keep learning, and to help others. After a first career spent in pursuit of money or status, many are choosing a second that is focused on giving back, such as teaching or healthcare. Along with abandoning the idea of a job-for-life, we might have to rethink other currently lifelong institutions, such as marriage. When we stick around a lot longer, the idea of a single partner for life looks increasingly implausible. A recent study in Canada showed that we alter our reproductive behavior in line with our life expectancy, just as life history theory would suggest: The longer-lived get married later and have children later, but are also more likely to divorce. Consciously or unconsciously, when we have more years ahead of us we become more likely to take the risk of trying for a new, happier arrangement. (6)

As people are anyway divorcing more frequently as they live longer, it might make sense to save them the pain of broken promises by replacing “till death do us part” with a time-limited marriage contract. Jonathan Swift suggested something like this in his 1726 novel *Gulliver’s Travels*, wherein the undying people automatically have their marriages annulled as soon as they’ve both turned 80. In what might be a sign of things to come, the idea of time-limited marriages was recently proposed by legislators in Mexico City, although it was blocked by conservatives. Some relationships counselors are now actively exploring this: the book *The New I Do* proposes a range of different kinds of contract, from the short-term “starter marriage” to the “parenting marriage” for the duration it takes to raise children. If the nuclear family then still existed, it would be recognized as a temporary phenomenon; one phase of many in the lives of those involved— anti-

ageing breakthroughs allowed women to have children later. We are currently seeing rising numbers of non-traditional family forms; when siblings, half-siblings and step-siblings are increasingly born decades apart from each other, these patchwork families will become ever more complicated. Changes like these might seem unnatural at first, but in a sense they are the opposite. Biology predicts both that each species will have a basic life plan, and also that it will adapt this plan to its particular environment. It is natural that we should adapt our life plan as our environment becomes more benign, with ample nutrition and medical technology giving us a good chance of living to a very ripe old age. These adaptations are already underway. For some this is unsettling, as ancient practices are called into question. But with a little imagination, we can see this as an opportunity for reinvention and renewal; to have what many have long dreamed of—a second, third, or fourth shot at life.

(7)

The surprising relationship between mindset and getting old

In 1979, psychologist Ellen Langer and her students carefully refurbished an old monastery in New Hampshire to resemble a place that would have existed two decades earlier. They invited a group of elderly men in their late 70s and early 80s to spend a week with them and live as they did in 1959, “a time when an IBM computer filled a whole room. Her idea was to return the men, at least in their minds, to a time when they were younger and healthier—and to see if it had physiological consequences. Every day Langer and her students met with the men to discuss “current” events. They talked about the first United States satellite launch, Fidel Castro entering Havana after his march across

Cuba, and the Baltimore Colts winning the championship game. Everything was transporting the men back to 1959. When Langer studied the men after a week of such sensory and mindful immersion in the past, she found that their memory, vision, hearing, and even physical strength had improved. She compared the traits to those of a control group of men, who had also spent a week in a retreat. The control group, however, had been told the experiment was about reminiscing. They were not told to live as if it were 1959. The first group, in a very objective sense, seemed younger. The team took photographs of the men before and after the experiment, and people who knew nothing about the study said the men looked younger in the after-pictures, says Langer, who today is a professor of psychology at Harvard University. Langer's experiment was a tantalizing demonstration that our chronological age based on our birthdate is a misleading indicator of aging. Langer, of course, was tackling the role of the mind in how old we feel and act. Since her study, others have taken a more objective look at the aging body. The goal is to determine an individual's "biological age," a term that aims to capture the body's physiological development and decline with time, and predict, with reasonable accuracy, the risks of disease and death. As scientists have worked to pinpoint a person's biological age, they have learned that organs and tissues often age differently, making it difficult to reduce biological age to a single number. They have also made a discovery that echoes Langer's work. How old we feel—our subjective age—can influence how we age. Where age is concerned, the pages torn off a calendar do not tell the whole story. While we intuitively know what it means to grow old,

precise definitions of aging haven't been easy to come by. In 1956, British gerontologist and author Alex Comfort memorably defined senescence as "a decrease in viability and an increase in vulnerability." Evolutionary biologists think of aging as something that reduces our ability to survive and reproduce because of "internal physiological deterioration." Such deterioration, in turn, can be understood in terms of cellular functions: The older the cells in an organ, the more likely they are to stop dividing and die, or develop mutations that lead to cancer. This leads us to the idea that our bodies may have a true biological age. The road to determining that age, though, has not been a straight one. One approach is to look for so-called biomarkers of aging, something that's changing in the body and can be used as a predictor of the likelihood of being struck by age-related diseases or of how much longer one has left to live. An obvious set of biomarkers could be attributes like blood pressure or body weight. Both tend to go up as the body ages. But they are unreliable. Blood pressure can be affected by medication and body weight depends on lifestyle and diet, and there are people who certainly don't gain weight as they age. (8)

The work with elderly men at the monastery in New Hampshire suggests that we can use the power of our mind to influence the body. Langer didn't publish her results in a scientific journal in 1979. At the time, she didn't have the resources to do a thorough study for the leading journals. "When you run a retreat over the course of five days, it's very hard to control for everything," Langer says. "Also, I didn't have the funds to have, for instance, a vacationing control group. I could have published it in a second-rate journal, but I didn't see any

point to that. Also, her argument that mind and body are one was potentially a little too path-breaking for the journals. “I think they were unlikely to buy the theoretical part of it,” she says. “The findings, improving vision and hearing in an elderly population, were so unusual that they were not going to rush to publish and stick their necks out.” Since then, Langer has pursued the mind-body connection and its effects on aging in rigorous studies that have been published in numerous scientific journals and books. Traditionally, the mind-body problem refers to the difficulty of explaining how our ostensibly non-material mental states can affect the material body (clearly seen in the placebo effect). To Langer, the mind and body are one. So Langer began asking if subjective mental states could influence something as objective as the levels of blood sugar in patients with diabetes. The 46 subjects in her study, all suffering from diabetes, were asked to play computer games for 90 minutes. On their desk was a clock. They were asked to switch games every 15 minutes. The twist in the study was that for one-third of the subjects, the clock was ticking slower than real time, for one-third it was going faster, and for the last third, the clock was keeping real time. “The question we were asking was would blood sugar level follow real or perceived time,” says Langer. “And the answer is perceived time.” This was a striking illustration of psychological processes—in this case the subjective perception of time—influencing metabolic processes in the body that control the level of blood sugar. The studies taken together provide clues as to why the week-long retreat in New Hampshire reversed some of the age-related attributes in elderly men. Because their minds were taken back to a time when they were younger, their bodies

too went back to that earlier time, bringing about some of the physiological changes that resulted in improved hearing or grip strength.

(9)

But it's important to point out that biological aging is an inexorable process—and there comes a time when no amount of thinking positive thoughts can halt aging. If body and mind are one and the same—as Langer suggests—then an aging body and aging mind go hand-in-hand, limiting our ability to influence physiological decline with psychological deftness. Still, Langer thinks that how we age has a lot to do with our perceptions of what aging means—often reinforced by culture and society. “Whether it's about aging or anything else, if you are surrounded by people who have certain expectations for you, you tend to meet those expectations, positive or negative,” says Langer. Most of us are slaves to our chronological age, behaving, as the saying goes, age-appropriately. For example, young people often take steps to recover from a minor injury, whereas someone in their 80s may accept the pain that comes with the injury and be less proactive in addressing the problem. “Many people all too often say, ‘Well, what do you expect, as you get older you fall apart,’ ” says Langer. “So, they don't do the things to make themselves better, and it becomes a self-fulfilling prophecy.” It's this perception of one's age, or subjective age, that interests Antonio Terracciano, a gerontologist at Florida State University. Horvath's work shows that biological age is correlated with diseases. Can one say the same thing about subjective age? People's perception of their own age can differ from person to person. People between the ages of 40 and 80, for example, tend to think they are younger. People who are 60 may say that they feel like they are 50 or

55, or sometimes even 45. Rarely will they say they feel older. However, people in their 20s often perceive their age to be the same as their chronological age, and may say they feel somewhat older. Terracciano and colleagues have found that subjective age correlates with certain physiological markers of aging, such as grip strength, walking speed, lung capacity. The younger you feel you are, the better are these indicators of age and health: You walk faster, have better grip strength and lung capacity. But how can one establish that our subjective age influences physiology and not the other way around? That's exactly what Yannick Stephan of the University of Grenoble in France and colleagues tried to find out. They recruited 49 adults, aged between 52 and 91, and divided them into an experimental and control group. Both groups were first asked their subjective age—how old they felt as opposed to their chronological age—and tested for grip strength to establish a baseline. The experimental group was told they had done better than 80 percent of people their age. The control group received no feedback. After this experimental manipulation, both groups were tested again for grip strength and asked about how old they felt. The experimental group reported feeling, on average, younger than their baseline subjective age. No such change was seen in the control group. Also, the experimental group showed an increase in grip strength, while the grip strength of the control decreased somewhat. These correlations do not necessarily mean that feeling young causes better health. Terracciano's next step is to correlate subjective age with quantitative biological markers of age. While no study has yet been done to find associations between the newly developed epigenetic markers and

subjective age, Terracciano is keen to see if there are strong correlations. Still, the message seems to be that our chronological age really is just a number. “If people think that because they are getting older they cannot do things, or cut their social ties, or incorporate this negative view which limits their life, that can be really detrimental,” says Terracciano. “Fighting those negative attitudes, challenging yourself, keeping an open mind, being engaged socially, can absolutely have a positive impact.”

(10)

Adapted from Nautilus.

Exercise III.

Find paragraphs, dealing with the following: chronic, balance, stretch, susceptible, mortality, youth, males, trend, span, implausible

Exercise IV.

Fill in the gaps.

1. A related civil lawsuit is against Apple in a federal court in New York.
2. I'll select an ostensibly trivial instance that is somehow appallingly
3. In difficult times humans are especially to promises of deliverance.
4. Attempting to answer these questions without a historical context is
5. That's why there's no need for you to any effort considering it yourself.
6. For many in the scientific community, these are unexpected and questions.

7. We are looking for exceptional web developers who are and highly productive.
8. During the current conflict, though, Britain's Muslim clerics have been unwilling to.....
9. Everyone knows that the price of PCs has been under downward pressure.
10. By all means, let's also solutions that you claim to be more sustainable.

Exercise V.

Make up sentences of your own with the following word combinations: not to stick their necks out, to go hand-in-hand, to limit one's ability, physiological decline, to keep an open mind, to fall apart, to bring about

Exercise VI.

Match the words to the definitions in the column on the right:

to bemoan	carry or drag (a heavy or bulky object) with great effort
smallpox	(especially of a word, phrase, etc.) unnecessary because it is more than is needed
to expend	complete with regard to every detail; not superficial or partial
ripe	a connection or series of connections linking two or more things
to pursue	the occurrence, rate, or frequency of a disease, crime, or

	something else undesirable
redundant	express discontent or sorrow over (something)
to lug	spend or use up (a resource such as money, time, or energy)
thorough	an extremely infectious disease that causes a fever, spots on the skin, and often death
nexus	completely developed and ready to be collected or eaten
incidence	follow (someone or something) in order to catch or attack them

Exercise VII.

Summarize the article “Ballooning life expectancies are upending age-old definitions of life stages”

Part 2

Exercise I.

Identify the part of speech the words belong to.

eloquent, susceptible, implausible, morbidity, infirmity, frolic, redundant, inexorable, deftness, detrimental

Exercise II.

Form nouns from the following words:

political (2), medical (2), necessarily (2), evolutionary (2), natural (2), multiple (2), relevant (2), consider (2), normal (2) massive (2)

Exercise III.

Find synonyms to the following words. Translate them into Russian:

rest (3), environment (3), spread (3), achieve (3), progress (3),
tremendous (3), change (10), divide (10), disease (10), open (10)

Exercise IV.

Find antonyms to the following words. Translate them into Russian
material (9), mental (9), objective (9), real (9), provide (9), average
(10), experimental (10), next (10), chronological (10), speed (10)

Exercise V.

Match the words to make word combinations:

chronic	lifespan
cardiac	community
social	tones
survival	pacemaker
medical	time
ominous	security
nursing	family
life	diseases
nuclear	home
natural	stages

2. Love Is Like Cocaine

Part 1

Exercise I.

Say what Russian words help to guess the meaning of the following words: cocaine, romantic, characteristics, emotional, central, component, literature, reality, extreme, contact

Exercise II

Make sure you know the following words and word combinations:

to roam, besotted, smitten, to relapse, sustained, to brood, to embark, smitten, wobbly, to spurn

Love Is Like Cocaine

From ecstasy to withdrawal, the lover resembles an addict. (1)

George Bernard Shaw knew the power of romantic love and attachment. Both are addictions—wonderful addictions when the relationship is going well; horribly negative addictions when the partnership breaks down. Moreover, these love addictions evolved a long time ago, as we roamed the grass of east Africa some 3.2 million years ago. Take romantic love. Even a happy lover shows all of the characteristics of an addict. Foremost, besotted men and women crave emotional and physical union with their beloved. This craving is a central component of all addictions. As their obsession builds, the lover seeks to interact with the beloved more and more, known in addiction literature as “intensification.” They also think obsessively about their

beloved, a form of thinking fundamental to drug dependence. Lovers also distort reality, change their priorities and daily habits to accommodate the beloved, and often do inappropriate, dangerous, or extreme things to remain in contact with or impress this special other. Even one's personality can change: many smitten humans are willing to sacrifice for their sweetheart, even die for him or her. And like addicts who suffer when they can't get their drug, the lover suffers when apart from the beloved—"separation anxiety." Trouble really starts, however, when a lover is rejected. Most abandoned men and women experience the common signs of drug withdrawal, including protest, crying spells, anxiety, sleep disturbances (sleeping way too much or way too little), loss of appetite or binge eating, irritability, and chronic loneliness. Lovers also relapse the way addicts do. Long after the relationship is over, events, people, places, songs, or other external cues associated with the abandoning partner can trigger memories. This sparks a new round of craving, compulsive calling, writing, or showing up—all in hopes of rekindling the romance. Because romantic love is regularly associated with a suite of traits linked with all addictions, several psychologists have come to believe that romantic love can potentially become an addiction.(2)

I believe romantic love is an addiction—as I have mentioned, a positive addiction when one's love is reciprocated, nontoxic, and appropriate; and a disastrously negative addiction when one's feelings of romantic love are inappropriate, poisonous or rejected. "If at first the idea is not absurd, then there is no hope for it," Einstein reportedly said. Few academics and laymen regard romantic love as an addiction—

because they believe that all addictions are harmful. Data do not support this notion, however. When neuroscientists Andreas Bartels and Semir Zeki compared the brains of happily-in-love participants with the brains of euphoric addicts who had just injected cocaine, many of the same regions in the brain's reward system became active. Moreover, when my colleagues reanalyzed our data on people who were happily in love, we found activity in a brain region linked with all of the addictions—including the cravings for cocaine, alcohol and even gambling and food. Men and women who are intensely and happily in love are addicted to their partner. So my brain-scanning partner, neuroscientist Lucy Brown, has proposed that romantic love is a natural addiction, “a normal altered state” experienced by almost all humans.(3)

Romantic attraction is now associated with a suite of psychological, behavioral, and physiological traits. Data collection largely began with the now classic dissection of this madness, found in *Love and Limerence*, by Dorothy Tennov. Tennov devised approximately 200 statements about romantic love and asked 400 men and women to respond with “true” or “false” reactions. From their responses, as well as their diaries and other personal accounts, Tennov identified a constellation of characteristics common to this condition of “being in love,” a state she called “limerence.” The first dramatic aspect of romantic love is its inception, the moment when another person begins to take on “special meaning.” But as one of Tennov's informants put it, “My whole world had been transformed. It had a new center and that center was Marilyn.” Romantic love then develops in a characteristic pattern, beginning with “intrusive thinking.” Thoughts of the “love object” begin to invade your mind. A certain thing he said

rings in your ear; you see her smile, recall a comment, a special moment—and relish it. You wonder what your beloved would think of the book you are reading, the movie you just saw, or the problem you are facing at the office. And every tiny segment of the time the two of you have spent together acquires weight and becomes material for review. At first these intrusive thoughts may occur irregularly. But many said that, as the obsession grew, they spent from 85 to almost 100 percent of their days and nights in sustained mental attentiveness, doting on this single individual. Indeed, lovers lose some ability to focus on other things, such as daily tasks and work; they become easily distracted. Moreover, they begin to focus on the most trivial aspects of the adored one and aggrandize these traits in a process called crystallization: in fact, most of Tennov's participants could list the faults of their beloved. But they simply cast these flaws aside or convinced themselves that these defects were unique and charming. Paramount in the daydreams of Tennov's informants were three overriding sensations: craving, hope, and uncertainty. If the cherished person gave the slightest positive response, the besotted partner would replay these precious fragments in reverie for days. Otherwise, uncertainty might turn to despair, the lover would moon about, brooding until he or she had managed to explain away this setback and renew the quest. And underlying all of this angst and ecstasy is unmitigated fear. A 28-year-old summed up what most informants felt: "I'd be jumpy out of my head," he said. "It was like what you might call stage fright, like going up in front of an audience. My hand would be shaking when I rang the doorbell. When I called her on the phone I felt like I could hear the pulse in my temple louder than

the ringing of the phone.” Intense energy is another central trait of romantic love. Lovers report trembling, a general weakness, butterflies in the stomach, a pounding heart, and difficulty eating or sleeping. Some even feel a loss of their most basic skills. Stendhal, the 19th-century French novelist, described this feeling perfectly. Recalling the afternoons he went strolling with his sweetheart, he wrote, “Whenever I gave my arm to Léonore, I always felt I was about to fall, and I had to think how to walk.” Shyness, anticipation, fear of rejection, longing for reciprocity, and intense motivation to win this special person are other central sensations of romantic passion. Above all, Tennov’s participants expressed the feeling of helplessness, the sense that this obsession was irrational and uncontrollable. Romantic love, it seems, is a panoply of intense emotions, rollercoastering from high to low, hinged to the pendulum of a single being whose whims command you to the detriment of everything around you—including work, family, and friends. (4)

Recently I embarked on a project to establish what happens in the brain when you fall deeply, madly in love. First I planned the experiment. I would collect data on brain activity as love-smitten participants performed two separate tasks: gazing at a photograph of their beloved, and looking at a photograph of someone who generated no positive or negative feelings in them. Between eyeing the positive and neutral photos, they would perform a distraction task. Then I would compare the brain activity that occurred under all three conditions. My hypothesis? Foremost, I suspected I would find elevated activity in the brain’s networks for dopamine, a natural stimulant—because this brain system generates energy, euphoria, craving, focus, and motivation, some

of the core traits of romantic love, as well as some of the bodily responses of romantic love such as butterflies in the stomach and wobbly knees. I expected that many other neurochemical systems might be involved—together producing the range of emotions, motivations, cognitions, and behaviors common to romantic love. But my bets were on dopamine. Then I put 17 new lovers into the brain scanner: 10 women and seven men who had been madly and happily in love for an average of 7.4 months. I will never forget the moment I first saw the results. I was standing in a darkened lab at the Albert Einstein College of Medicine. I felt like jumping in the sky. The results were stunning. Before my eyes were scans showing blobs of activity in the tiny factory near the base of the brain that makes dopamine and sends this natural stimulant to many brain regions. This factory is part of the brain's reward system, the brain network that generates wanting, seeking, craving, energy, focus, and motivation. No wonder lovers can stay awake all night talking. No wonder they become so absent-minded, so optimistic, so full of life. They are high on natural "speed." Brain activations occurred in several regions of the reward system. Included were regions of the brain associated with feelings of intense romantic love, deep attachment, physical pain, anxiety and regions associated with assessing one's gains and losses—as well as craving and addiction. Most relevant to our story, activity in several of these brain regions has been correlated with the craving of cocaine addicts and other drugs. In short, as our brain scanning data show, these discarded lovers are still madly in love with and deeply attached to their rejecting partner. They are in physical and mental pain. Like a mouse on a treadmill, they are

obsessively ruminating on what they've lost. And they are craving reunion with their rejecting beloved—addiction. (5)

Men feel this passion just as powerfully as women. Tenov wrote of her more than 800 informants that men and women experienced this intense passion “in roughly equal proportions.” My colleagues and I have now confirmed this. In fact, because this factory lies near primitive brain regions associated with thirst and hunger, I came to realize that romantic love is a basic human drive. My brain-scanning partner Brown has added to this perspective, saying that romantic love is a survival mechanism as crucial as the craving for water. This drive, this survival mechanism, is also an addiction. Moreover, we are not the only creatures that have inherited the chemistry of love. This mechanism for attraction must have evolved in many species of birds and mammals—to enable individuals to prefer and focus on specific mating partners, thereby conserving valuable courtship time and energy. In most species, however, this attraction is brief, lasting only minutes, hours, days, or weeks. In humans, intense, early-stage romantic love can last much longer. There is always variation in this experience, however. Baseline activities of dopamine vary from one person to the next—potentially altering one's proclivity to fall in love and stay in love. But few of us get out of love alive. 93 percent of both sexes reported that they had been spurned by someone they passionately loved, while 95 percent reported that they had rejected someone who was deeply in love with them. And this can be just the first disappointment. Many may get dumped again in later life. There is a pattern to this trajectory of abandonment and recovery. During the first stage, the protest phase, the deserted lover works obsessively to regain the abandoning partner's affection. As

despair sets in, the lover gives up hope and slips into depression. Both are linked with the dopamine system in the brain. “The less my hope there is, the more I love her.” Over 2,000 years ago the Roman poet, perfectly captured this experience. When lovers encounter barriers to their romantic feelings, their passion intensifies—what I call frustration-attraction. Adversity heightens feelings of romantic love. This phenomenon is rooted in the brain. When a reward is delayed in coming, neurons of the brain’s dopamine system continue their activity—sustaining one’s feelings of intense romantic love. Addiction has set in. Many abandoned people oscillate between heartbreak and fury—another response with neural correlates. This rage response to unfulfilled expectations is well known in other mammals. When a cat is petted, for example, it purrs. When this pleasurable stimulation is withdrawn, it sometimes bites. Moreover, these feelings of romantic love and rage can act in tandem. The lover’s level of anger/upset oscillates in response to events that undermine the lover’s goals, such as a mate’s infidelity, lack of emotional commitment, or rejection. The lover’s feelings of romantic love fluctuate in response to events that advance the lover’s goals, such as a partner’s visible social support during outings with relatives and friends, or a direct declaration of love and fidelity. (6)

Many professionals define addiction as a pathological, problematic disorder. And because romantic love is a positive experience under many circumstances (i.e. not harmful), researchers remain largely unwilling to officially categorize romantic love as an addiction. But love addiction is just as real as any other addiction, in terms of its behavior patterns and brain mechanisms. Even when romantic love isn’t harmful,

it is associated with intense craving and anxiety and can impel the lover to believe, say, and do dangerous and inappropriate things. Moreover, all forms of substance abuse, including alcohol, cocaine and tobacco (as well as the non-substance addictions to food or gambling) activate several of the same reward pathways that are activated among men and women who are happily in love, as well as those rejected in love. Unlike all other addictions, however, which afflict only a percentage of the population, some form of love addiction is likely to occur to almost every human being at some point during the life course. Modern data suggest that romantic love should be treated as an addiction, regardless of its lack of official diagnostic classification as an addiction. The human seems driven by a tide of feelings that flow to an internal beat, a rhythm that emerged when our ancestors first descended from the trees of Africa and developed a tempo to their relationships that was in synchrony with their natural breeding cycle—three to four years. Perhaps the brain's systems for dopamine and other neurochemicals orchestrate this rhythm, escalating when you fall in love, changing as you begin to feel deep attachment, then eventually becoming overloaded, leading to indifference that slowly eats your love and leads to separation—a hardship that can trigger the mother of all addictions, addiction to a mate. (7)

Adapted from Nautilus.

Exercise III.

Find paragraphs, dealing with the following: to rekindle, laymen, setback, angst, pendulum, smitten, trouble, abandoned, relapse, rekindling

Exercise IV.

Fill in the gaps.

1. Kerry was absolutely with him and Kevin loved being with Kerry.
2. The junior high student was quickly by the man's smooth online flattery.
3. Mitsubishi Motors plans to its failed policy of pursuing the mainstream.
4. She tried to her relationship with Mark, but there was too much damage.
5. Chances are will be dangerously ignorant of what they don't know.
6. They were friendly without being and professional without being stiff.
7. Producers have watched prices rise and fall at a rate.
8. And let's face it, while guilt may some celebrities to volunteer, guilt is a two-way street.
9. It is our plan to create jobs now and economic growth for years to come.
10. He could see something of himself in her, that same hardness in the face of

Exercise V.

Make up sentences of your own with the following word combinations:
to moon about smth, to remain in contact, to feel deep attachment, be associated with, in short

Exercise VI .

Match the words to the definitions in the column on the right:

overriding	get rid of (someone or something) as no longer useful or desirable
to abandon	continuing for a long time
to trigger	a job or situation that is tiring, boring, or unpleasant and from which it is hard to escape
breeding	a difficult or unlucky situation or event
to sustain	cause (an event or situation) to happen or exist
adversity	more important than anything else:
treadmill	to leave a place, thing, or person, usually for ever
to discard	the mating and production of offspring by animals
to impel	strengthen or support physically or mentally
sustained	drive, force, or urge (someone) to do something

Exercise VII.

Summarize the article “Love Is Like Cocaine”.

Part 2

Exercise I.

Identify the part of speech the words belong to.

intensification, limerence, constellation, intrusive, romance, potentially, appropriate, disastrously, poisonous, harmful

Exercise II.

Form verbs from the following words:

dependence (1), separation (1), participants (1), characteristic (2), rejection (2), motivation (2), survival (3), abandonment (3), recovery (3), harmful (4)

Exercise III.

Find synonyms to the following words. Translate them into Russian:

collect (5), classification (6), several (6), abuse (6), substance (6), cycle (6), anxiety (7), separation (7), addiction (7)

Exercise IV.

Find antonyms to the following words. Translate them into Russian:

intense (5), activity (5), lack (6), unlike (6), official (6), reject (6), indifference (7), inappropriate (7), intense (7)

Exercise V.

Match the words to make word combinations:

roller	humans
sleep	component
drug	coaster
smitten	withdrawal
daily	lover
central	signs
romantic	addictions
happy	disturbances
love	habits
common	love

3. The Problem with Modern Romance Is Too Much Choice

Part 1

Exercise I.

Say what Russian words help to guess the meaning of the following words: romance, options, potential, typically, intrigued, paradox, experiment, prospect, mental, resources

Exercise II.

Make sure you know the following words and word combinations.

Unfettered, to stultify, to hamstring, curated, to shun, quirk, to protract, flux, ballpark, to persevere

The Problem with Modern Romance Is Too Much Choice

In the age of online dating there are more romantic options than there are fish in the sea, well, you know. On the appropriately named site Plenty of Fish, for instance, you can pore over profiles of hundreds or thousands of potential mates before deciding which ones to contact. Such unfettered choice means a better shot at true love—or so many daters believe. The more options you have, the assumption goes, the more likely you are to find the one who truly suits you. Yet many daters are finding that less romantic choice yields top-notch results without all the angst. My longtime friend found her husband using eHarmony, which has its customers fill out a detailed compatibility survey, then sends them a restricted number of matches, typically anywhere from a few to a dozen or so at a time. Two weeks after she signed up for the

site, she spotted a guy who intrigued her. They clicked so well that their second date stretched to 11 hours, and within months, they were starting to talk marriage. She was shocked—and thrilled—to have found the love of her life with relative ease. On sites with countless options, “there would have been so many people who would not have been good fits,” she says. “I don’t think I would have enjoyed weeding them all out—it would have been way too much work.” Successes like hers are unsurprising to Barry Schwartz, Professor of Social Theory. Schwartz has spent years arguing that limiting our options consistently leads to better outcomes. He thinks too much choice overwhelms us and makes us unhappy—a phenomenon he calls the paradox of choice. Endless choices, Schwartz says, are more stultifying than gratifying. In one experiment dubbed “the jam study,” grocery-store shoppers scanning 24 different gourmet jams were less likely to make a purchase than shoppers who looked at only six jams. The shoppers choosing from a wider selection were also unhappier with the jam they’d bought. The problem, Schwartz explains, is that when you have more options, you tend to put more pressure on yourself to make the perfect choice—and you feel more let down when it doesn’t turn out to be perfect, after all. “Even when you choose well, you end up disappointed,” Schwartz says. “You’re convinced that even though you did well, you should have done better.” Based on work by psychologists Daniel Kahneman and Amos Tversky, who have shown bad feelings about losses are stronger than good feelings we have about gains, Schwartz argues that as you’re presented with countless choices, your pleasure at the prospect of more

options is canceled out by the anticipated loss of making a wrong choice. (1)

Since 2004, when Schwartz published *The Paradox of Choice*, researchers have quibbled with the idea that lots of choices are bound to overtax our mental resources, leading to decision paralysis and unhappiness. When Benjamin Scheiben, a professor of cognition and consumer behavior at the University of Geneva, set out to replicate the jam study, he found no evidence that people were less satisfied with their choices when they had a larger array to select from. “It seems to be fairly difficult to overload or confuse or frustrate people just based on the number of options,” he says. “In most situations, people are quite good at coping.” He points out that if abundant choice were really as paralyzing as Schwartz and others have proposed, people would constantly get stymied in everyday situations like deciding which shirt to wear or what to have for lunch. Instead, he argues that people generally avoid being overwhelmed by practicing a kind of quick-and-dirty mental judo, using some kind of shortcut to limit their choices—whether that means giving certain factors more weight or simply skipping some of the presented choices. “If there are more initial options available, all decision-makers have to do is tune their filtering procedure,” he says. It’s smart to use some sort of conscious method to narrow your sights—whether that means relying on a web site’s compatibility formula or concocting your own instinctive rule of thumb. People who do this usually end up with a set of reasonably good options that fit their needs, and they’re not overwhelmed anymore. Both Scheiben and Schwartz agree that limiting choices is a natural human drive. Where they differ is on whether having a large number of initial choices breeds

dissatisfaction. Scheiben research indicates it doesn't. But Schwartz counters that while we often like the idea of unrestricted choice, the satisfaction we think it will bring doesn't always materialize. "We always think we want choice," Schwartz writes, "but when we actually get it, we may not like it." (2)

The debate over the paradox of choice has often revolved around the mundane: what digital camera to buy, which tropical vacation spot to book, what to watch in the cinema. Now independent research reveals that when it comes to helping people obtain what they truly need—a romantic partner, someone with whom to share life's traumas and triumphs—less is indeed more. Nowhere are the benefits of choice-limiting more profound than in the realm of love. The brain's architecture helps explain why a choice free-for-all can burn us out so easily. In a Harvard study where people were presented with a series of similar options, brain areas responsible for anxiety lit up on their functional scans as they struggled to make a decision. Since the Internet, social media, and crafty marketers present us with so many more similar choices now than we had even 20 years ago, our brains are likely churning out this anxious response on a regular basis. Over time, such constant indecision can darken your mood and outlook. The dopamine system, involving brain chemicals and neural actions involved in reward and punishment, is working overtime. "Under continued stress, the dopamine system tends to get depleted, and you might fall into feelings of continual despair," says biological anthropologist Helen Fisher. "This sort of thing could happen to the brain when you get too many choices." Online daters can testify to the way their eyes glaze over

after they've clicked through a few dozen profiles. And when you don't have any clear way to rank your options—when you dredge up a bunch of prospects who are all brunette, funny, and into rock-climbing—you'll probably start to feel like the donkey who starved in a hayfield because he couldn't decide which hay pile to eat. “The more people you look at, the less likely you are to choose anybody,” says Fisher. Humans lived in small hunter-gatherer groups for many thousands of years and often chose their mates from within those groups. So it makes perfect sense, Fisher says, that we're not biologically equipped to process the mate-choice bonanza of the Internet age. When you try to surpass your mental limitations, you may get caught up in your fear of making a wrong choice, just as Schwartz would predict. A University of Wisconsin study of online daters found that daters who chose from a pool of 24 possible partners were less satisfied with who they picked than daters who chose from a pool of only six. On top of that, the daters who had more options were more likely to want to reverse their decisions. Perhaps they just couldn't shake the thought that they were missing out on something better. If you do persist in choosing someone from a large array, not only will you come away less satisfied—you'll probably make a worse choice. When online daters had more search options in a University of Taiwan study, they spent less time considering each possibility and found it harder to sort the good prospects from the bad ones. Stretching your cognitive capacity too thinly, the researchers explain, tends to hamstring you on irrelevant details and distract you from the criteria you consider most important. That suggests that in order to assess the qualities that matter—which, for most people, are things like a partner's

honesty, his dependability, her sense of humor—you need to go deeper in your search, not wider. (3)

Does that mean you should opt for the expert-guided approach proffered by vendors like eHarmony? Quite a few daters appreciate curated selection enough to be willing to pay extra for it, and Hanna Halaburda, a professor at New York University and senior economist at the Bank of Canada, conducted a study (independent of eHarmony) to figure out why. For starters, Halaburda says, you face less competition in a restricted-choice scenario. You'll be one of the few options that appears in other daters' lists, meaning they'll consider you more seriously than they would if you were one of thousands. And when your own choice is curtailed, you'll evaluate your options differently, too. "Having less choice forces you to look more carefully at the person," Halaburda says. That means you might hit the romantic jackpot with someone you'd once have shunned for a superficial reason (their piercing, say, or their love for the Oakland Raiders). Most sites also ask users to jump through some hoops to participate. The eHarmony compatibility questionnaire, for instance, can take people hours to complete, and that creates a different, smaller user pool from the beginning. "You know that once you are on this platform, your potential partner has also invested a lot to be on this platform," Halaburda says. That commitment signifies the seriousness of your would-be paramour's intentions, a big plus for many busy professionals. What's more, a choice-narrowing computer program that takes a range of factors into account—personality quirks, beliefs and values—can save you from your own worst romantic impulses. Left to face too many choices on your own, you might revert to superficial preferences without even

realizing it. In one study of speed daters, women chose their partners mostly on the basis of appearance, giving deeper qualities more weight only when they had fewer partner choices. “You’re likelier to make bad decisions when there are lots of options,” Schwartz says, “especially if it’s a complicated decision.” With a smaller pool, you can devote your mental resources to making sure your potential partners have the vital qualities most important to you in a relationship. (4)

The less-is-more calculus changes a bit if you expect your future partner to fit very specific criteria. Professor Alexander Chernev has found that people who have strong ideas about what they want relish choosing from a larger assortment. Ruthless filtering may help explain this result: If you only want to date a vegan like yourself, your set of serious options will end up being manageable post-filter, even if your initial pool of options is large. For those whose preferences aren’t so specific, though, the filtering process isn’t as easy or straightforward, and the threat of overwhelming choices looms larger. But whether the choosing process is simple or protracted, it’s no easy feat to banish the grass-is-greener thoughts that always seem to pop up later on, telling you to widen your horizons, keep your options open, bail out when things get rough. Still, Schwartz says, familiarity with the pain of too many choices—losing a true soul mate, perhaps, because you had one eye on other prospects—may help temper the anxiety of limiting your options. “The way you learn this is by suffering with the problem of choice,” he says. Even if limiting your dating choices brings practical and emotional benefits, it’s worth asking whether those benefits justify giving up a certain amount of individual agency. Signing up for a choice-limiting site involves trusting a computer algorithm to make key

calls for you—like deciding which handful of people, out of a potential pool of thousands, you’ll be able to get to know more deeply. The algorithm is a black box, the contents of which remain in flux as programmers tweak this or that line of code or re-weight one personality variable against another. Even outside the online-dating realm, some might argue that any option-limiting shortcut is a copout—that you need to take the full measure of a choice like who your life partner should be, even when choosing is tedious or uncomfortable. (5)

It’s a compelling argument, one born of the same impulse that drives Western cultural resistance to arranged marriage. And importantly, it’s clear that we really don’t like to bail out of the choice process entirely. Experiments where people were only given one DVD player option to buy, they were less likely to make a purchase than they were if they had two or more options—a reaction researcher Daniel Mochon calls “single-option aversion.” The paradox of choice may be alive and well, but our choices, romantic and otherwise, must also be numerous enough to be meaningful. So is there an ideally sized choice set when it comes to dating—one large enough to include variety and depth, yet small enough that you can fairly weigh each prospect’s potential without tripping your brain’s overload switch? “People are trying to make a hard problem easy by suggesting there’s a magic number,” Schwartz says. In experiments involving consumer products, he points out, the optimal number of choices seems to be between 8 and 12. Fisher puts people somewhere in the middle of that range. “Once you’ve met nine people who are vaguely in the ballpark, choose one and get to know that person better. If nothing works in that nine, go for

another nine,” she says. “But stop going out with a million different people. The human brain has never been built to have 20,000 choices for a partner.” Until recently in human history, most people only would have had a handful of mate choices. Yet most partners stayed together for life, and real-life stories of deathless love— Marie and Pierre Curie—still echo through the generations. What forms and cements lasting partnerships, then as today, is not unfettered choice that serial daters imagine will usher in the perfect match. It’s finding someone who feels like home, in the truest sense of the word, and settling in. “Often, you don’t find out about the things that matter until you get to know somebody pretty well,” Schwartz says. “With a million options, you’re less likely to persevere.” In the realm of relationships, then, keeping choice in check is what frees you to forge the thoughtful connections that make for lasting love. Mulling a manageable number of options with care and depth is a strategy more exhaustive—and, ultimately, more effective—than scanning every single profile on dating sites. Paradoxically enough, narrowing your sights might end up being the most liberating romantic choice of all. (6)

Exercise III.

Find paragraphs, dealing with the following: angst, gourmet, to quibble, to stymie, shortcut, to concoct, to mull, replicate, frustrate

Exercise IV.

Fill in the gaps.

1. However, it does require the hacker to have
root access to the phone.

2. Investors need only a little bit of optimism to invest in the high-..... sector.
3. The purpose of the manuscripts are to teach, entertain and the senses.
4. India, however, does not align with specific countries in the of politics.
5. If they don't they simply..... an already short supply of potential employees.
6. His and enthusiasm for his work earned him a permanent position.
7. He didn't appear to be putting too much pressure on his strained left
8. Writers need to be in the editing, always honing and shaping the piece.
9. It is important to and continue to search out the right opportunities.
10. An of couscous dishes will be served, in addition to the regular menu.

Exercise V.

Make up sentences of your own with the following word combinations:
 quick and dirty, rule of thumb, free-for-all, to churn out, to dredge up,
 cop out, to settle in, to keep in check

Exercise VI.

Match the words to the definitions in the column on the right:

to deplete	give evidence as a witness in a law court
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yield	give (someone) pleasure or satisfaction
to persist	making you feel free and able to behave as you like
realm	not able to be resisted; overwhelming
array	give way to stop in order to allow other vehicles to go past, especially before you drive onto a bigger road
to testify	use up the supply of; exhaust the abundance of
to overwhelm	to continue to exist past the usual time, or to continue to do something in a determined way even when facing difficulties or opposition
compelling	an area of interest or activity
liberating	an impressive display or range of a particular type of thing
to gratify	be too strong for; overpower

Exercise VII.

Summarize the article “The Problem with Modern Romance Is Too Much Choice”

Part 2

Exercise I.

Identify the part of speech the words belong to.

dependability, superficial, assortment, ruthless, handful, decision, unhappiness, cognition, consumer, behavior

Exercise II.

Form adjectives from the following words: appropriately (1), experiment (1), evidence (1), constantly (1), reasonably (3), biologically (1), humor (1), consider (1) seriously (1), carefully (1)

Exercise III.

Find synonyms to the following words. Translate them into Russian: save (4), value (4), belief (4), busy (4), devote (4), meaningful (5), strategy (5), paradoxical (5), option (6), choice (6)

Exercise IV.

Find antonyms to the following words. Translate them into Russian: seriousness (4), senior (4), easy (5), middle (5), exhaustive (5), narrow (5), numerous (5), care (5), alive (5), purchase (6)

Exercise V.

Match the words to make word combinations:

true	options
------	---------

top	choice
arranged	romance
potential	choice
romantic	mates
wrong	notch
unfettered	marriage
top-notch	love
modern	friend
longtime	results

4. Don't Worry, Smart Machines Will Take Us With Them

Part 1

Exercise I.

Say what Russian words help to guess the meaning of the following words: experts, confidence, programs, agents, evolution, potential, embryonic, individuals, historical, process

Exercise II.

Make sure you know the following words and word combination

Fallacy, loci, to outstrip, to tinker, reboot, to conceptualize, counterpart, incomprehensible, , unknowable, consequential

Don't Worry, Smart Machines Will Take Us With Them

Why human intelligence and AI will co-evolve

When it comes to artificial intelligence, we may all be suffering from the fallacy of availability: thinking that creating intelligence is much easier than it is, because we see examples all around us. In a recent poll, machine intelligence experts predicted that computers would gain human-level ability around the year 2050, and superhuman ability less than 30 years after. But our confidence is probably inflated. AI can be thought of as a search problem over an effectively infinite, high-dimensional landscape of possible programs. Nature solved this search problem by brute force, effectively performing a huge computation involving trillions of evolving agents of varying information processing capability in a complex environment (the Earth).

It took billions of years to go from the first tiny DNA replicators to *Homo Sapiens*. What evolution accomplished required tremendous resources. While silicon-based technologies are increasingly capable of simulating a mammalian or even human brain, we have little idea of how to find the tiny subset of all possible programs running on this hardware that would exhibit intelligent behavior. But there is hope. By 2050, there will be another rapidly evolving and advancing intelligence besides that of machines: our own. The potential for improved human intelligence is enormous. Cognitive ability is influenced by thousands of genetic loci, each of small effect. If all were simultaneously improved, it would be possible to achieve, very roughly, about 100 standard deviations of improvement, corresponding to an IQ of over 1,000. We can't imagine what capabilities this level of intelligence represents, but we can be sure it is far beyond our own. Cognitive engineering, via direct edits to embryonic human DNA, will eventually produce individuals who are well beyond all historical figures in cognitive ability. By 2050, this process will likely have begun. These two threads—smarter people and smarter machines—will inevitably intersect. Just as machines will be much smarter in 2050, we can expect that the humans who design, build, and program them will also be smarter. Naively, one would expect the rate of advance of machine intelligence to outstrip that of biological intelligence. Tinkering with a machine seems easier than modifying a living species, one generation at a time. But advances in genomics—both in our ability to relate complex traits to the underlying genetic codes, and the ability to make direct edits to genomes—will allow rapid advances in biologically-based cognition. Also, once

machines reach human levels of intelligence, our ability to tinker starts to be limited by ethical considerations. Rebooting an operating system is one thing, but what about a sentient being with memories and a sense of free will? (1)

Therefore, the answer to the question “Will AI or genetic modification have the greater impact in the year 2050?” is yes. Considering one without the other neglects an important interaction. It has happened before. It is easy to forget that the computer revolution was led by a handful of geniuses: individuals with truly unusual cognitive ability. Alan Turing and John von Neumann both contributed to the realization of computers whose program is stored in memory and can be modified during execution. This idea appeared originally in the form of the Turing Machine, and was given practical realization in the so-called von Neumann architecture of the first electronic computers, such as the EDVAC. While this computing design seems natural, even obvious, to us now, it was at the time a significant conceptual leap. Turing and von Neumann were special, and far beyond peers of their era. Both played an essential role in the Allied victory in WWII. Turing famously broke the German Enigma codes, but not before conceptualizing the notion of “mechanized thought” in his Turing Machine, which was to become the main theoretical construct in modern computer science. Before the war, von Neumann placed the new quantum theory on a rigorous mathematical foundation. As a frequent visitor to Los Alamos he made contributions to hydrodynamics and computation that were essential to the United States’ nuclear weapons program. Today, we need geniuses like von Neumann and Turing more

than ever before. That's because we may already be running into the genetic limits of intelligence. In a 1983 interview, Noam Chomsky was asked whether genetic barriers to further progress have become obvious in some areas of art and science. He answered: "You could give an argument that something like this has happened in quite a few fields. I think it has happened in physics and mathematics, for example. In talking to students at MIT, I notice that many of the very brightest ones, who would have gone into physics twenty years ago, are now going into biology. I think part of the reason for this shift is that there are discoveries to be made in biology that are within the range of an intelligent human being. This may not be true in other areas." (2)

AI research also pushes even very bright humans to their limits. The frontier machine intelligence architecture of the moment uses deep neural nets: multilayered networks of simulated neurons inspired by their biological counterparts. Silicon brains of this kind, running on huge clusters of GPUs (graphical processor units made cheap by research and development and economies of scale in the video game industry), have recently surpassed human performance on a number of narrowly defined tasks, such as image or character recognition. We are learning how to tune deep neural nets using large samples of training data, but the resulting structures are mysterious to us. The theoretical basis for this work is still primitive. The neural networks researcher and physicist Michael Nielsen puts it this way: "... in neural networks there are large numbers of parameters and hyper-parameters, and extremely complex interactions between them. In such extraordinarily complex systems it's exceedingly difficult to establish reliable general statements.

Understanding neural networks in their full generality is a problem that, like quantum foundations, tests the limits of the human mind”. (3)

The detailed inner workings of a complex machine intelligence (or of a biological brain) may turn out to be incomprehensible to our human minds—or at least the human minds of today. While one can imagine a researcher “getting lucky” by stumbling on an architecture or design whose performance surpasses his own capability to understand it, it is hard to imagine systematic improvements without deeper comprehension. But perhaps we will experience a positive feedback loop: Better human minds invent better machine learning methods, which in turn accelerate our ability to improve human DNA and create even better minds. The feedback loop between algorithms and genomes will result in a rich and complex world, with myriad types of intelligences at play: the ordinary human (rapidly losing the ability to comprehend what is going on around them); the enhanced human (the driver of change over the next 100 years, but perhaps eventually surpassed); and all around them vast machine intellects. Rather than the standard science-fiction scenario of relatively unchanged, familiar humans interacting with ever-improving computer minds, we will experience a future with a diversity of both human and machine intelligences. For the first time, sentient beings of many different types will interact collaboratively to create ever greater advances, both through standard forms of communication and through new technologies allowing brain interfaces. We may even see human minds uploaded into cyberspace, with further hybridization to follow in the purely virtual realm. These uploaded minds could combine with artificial algorithms and structures to produce an unknowable but humanlike consciousness.

Researchers have recently linked mouse and monkey brains together, allowing the animals to collaborate—via an electronic connection—to solve problems. This is just the beginning of “shared thought.” (4)

It may seem incredible, or even disturbing, to predict that ordinary humans will lose touch with the most consequential developments on planet Earth, developments that determine the ultimate fate of our civilization and species. Yet consider the early 20th-century development of quantum mechanics. The first physicists studying quantum mechanics in Berlin—men like Albert Einstein and Max Planck—worried that human minds might not be capable of understanding the physics of the atomic realm. Today, no more than a fraction of a percent of the population has a good understanding of quantum physics, although it underlies many of our most important technologies: Some have estimated that 10-30 percent of modern gross domestic product is based on quantum mechanics. In the same way, ordinary humans of the future will come to accept machine intelligence as everyday technological magic, like the flat screen TV or smartphone, but with no deeper understanding of how it is possible. New gods will arise, as mysterious and familiar as the old. (5)

Adapted from Nautilus.

Exercise III.

Find paragraphs, dealing with the following: threads, naively, genomics, ethical, neglect, geniuses, leap, codes, rigorous, hydrodynamics

Exercise IV.

Fill in the gaps.

1. I had spotted plenty of these while working on my undergraduate degree.
2. Twitter was cluttered with shutdown jokes and a of shutdown pickup lines.
3. Sales of Android-enabled phones those of BlackBerrys and even iPhones.
4. Structure is rarely the chief culprit behind poor decision making and
5. This provides a new for describing entire data centers using meta data.
6. It's and nonsensical to them, which makes it the same as magic.
7. The detailed consequences of this, however, are unknown and possibly
8. The hemisphere is united with its opposite to form a complete globe.
9. Complex systems tend to be, non-linear and hard to model.
10. GameWorks is owned by Sega, which gives it a unique

Exercise V.

Make up sentences of your own with the following word combinations:

economy of scale, result in, lose touch with, to suffer from, to make direct edits, to reach human levels of intelligence

Exercise VI .

Match the words to the definitions in the column on the right:

superhuman	a study in which people are asked for their opinions about a subject or person:
infinite	intelligent, or able to think quickly or intelligently in difficult situations
poll	a long, thin line or piece of something
execution	limitless or endless in space, extent, or size; impossible to measure or calculate
frontier	having more powers than, or seeming outside the powers of, a human
rigorous	any animal of which the female feeds her young on milk from her own body
thread	a thing that replicates or copies something
	extremely thorough, exhaustive, or accurate
mammalian	a line or border separating two

	countries
replicator	the carrying out or putting into effect of a plan, order, or course of action

Exercise VII.

Summarize the article “Don’t Worry, Smart Machines Will Take Us With Them”.

Part 2

Exercise I.

Identify the part of speech the words belong to.

computation, essential, intelligence, obvious, argument, physics, mathematics, performance, recognition, mysterious

Exercise II.

Form adjectives from the following words:

easy (1), tremendous (1), enormous (1), ethical (1), unusual (1), practical (1), obvious (1), essential (1), theoretical (1)

Exercise III.

Find synonyms to the following words. Translate them into Russian:

frequent (2), contribution (2), essential (2), visitor (2), interview (2), barrier (2), true (2), bright (2), unit (3), development (5)

Exercise IV.

Find antonyms to the following words. Translate them into Russian:

construct (5), capable (5), fraction (5), estimate (5), domestic (5), arise (5), flat (5), accept (5), familiar (5), ordinary (5), (9)

Exercise V.

Match the words to make word combinations:

superhuman	bias
search	loop
availability	processing capability
gross	problem
feedback	intelligence
human	intelligence
information	replicators
smart	domestic product
artificial	machines
DNA	ability

SUPPLEMENTARY READING

Love in the Age of Big Data

Scientists believe they've discovered a simple formula for happy relationships.

Once upon a time, in the Pony Espresso cafe in Seattle, a man and a woman began to experience the long-mysterious but increasingly scientifically investigated thing we call love. The first stage is called "limerence." This is the spine-tingling, heart-twisting, can't-stop-staring feeling, when it seems as though the world stops whirling and time itself bows down and pauses before the force of your longing. The man, a then-44-year-old University of Washington research psychologist named John Gottman, was drawn to the woman's wild mane of black curly hair and her creativity: She was an amateur musician and painter as well as a psychologist like himself. The woman, a then-35-year-old named Julie Schwartz, who'd placed a personal ad in the Seattle Weekly that John had answered, was turned on by John's humble little car—voted the ugliest vehicle in the University of Washington faculty parking lot—and his expansive curiosity. He read physics and math and history and kept a little spiral-bound notebook in his pocket that he used to jot down things his companions said that captivated him.

They talked avidly; it felt as if they'd known each other forever. Over the following months they drew closer and closer, proceeding through subsequent stages of building a fulfilling love relationship. John learned about the unhappy home life growing up in Michigan that had driven Julie to spend so much time in the forest by herself, and Julie learned about John's desire to understand deeply earth's biggest mysteries, like the nature of time. Although they were afraid—they'd both been divorced before—they confided their admiration for each other, John's for the courage Julie showed in her therapy practice by helping the "sickest of the sickest," schizophrenics and Vietnam veterans on Skid Row, and Julie's for John's absurdist sense of humor. They kayaked together. They joined a synagogue. They married and had a daughter, fulfilling one of John's longtime dreams, and bought a house on a forested island three hours north of Seattle, fulfilling a dream of Julie's. They fought. They attended couples therapy. Through their conflict they came to love each other more. Twenty-nine years after that first date, John Gottman and Julie Schwartz Gottman stood on a black stage in a ballroom of the Seattle Sheraton in front of about 250 other

couples, young and old, straight and gay. The intense intimacy of their relationship was on full display: They finished each other's sentences, bantered with each other and talked candidly about how their struggles had made them stronger. Julie wept. John held Julie, caressing her hair. The rest of us, seated in chairs that had been hooked together in sets of twos, watched them with yearning. We'd come to see the Gottmans because the pair has spent the last 20 years refining a science-based method to build a beautiful love partnership yourself. They reveal it over a two-day, \$750-per-pair workshop called "The Art and Science of Love." "It turns out Tolstoy was wrong," John told the crowd in an opening lecture. "All happy relationships are similar and all unhappy relationships are also similar. ... Is there a secret? It turns out, empirically, yes, there is a secret."

Over decades, John has observed more than 3,000 couples longitudinally, discovering patterns of argument and subtle behaviors that can predict whether a couple would be happily partnered years later or unhappy or divorced. He has won awards from the National Institute of Mental Health and the National Council of Family Relations and has become the subject of increasing public fascination. He went on Oprah and the "Today" show. A book he co-authored that summarizes his findings, *Seven Principles for Making Marriage Work*, is a New York Times best-seller. His work took off because the consistency of his predictions is astonishing. One 1992 experiment found that certain indicators in how couples talked about their relationship could forecast—with 94 percent accuracy—which pairs would stay together. This was magic—a virtually foolproof way of distinguishing toxic partnerships from healthy ones even before the couples knew themselves—but it was also science, so it appealed to our contemporary desire to use empirical data to better our lives. Walk by any newsstand, or trawl the Internet for three minutes, and you'll find data-driven methods to improve everything we do.

You might expect love to be the last frontier breached by data. It is the Antarctic of the human experience, richly feeding the oceans of our emotions, yet somehow remaining elusive and unknown. Philosophers have argued over it for millennia without arriving at a satisfactory definition. Poets like Erich Fried capture its strange mix of pleasure and pain, the sense of its essential ungovernability: "It is foolish, says caution / It is impossible, says experience / It is what it is, says love." I first encountered Gottman's research last year in an Atlantic article

called "Masters of Love." It went viral; my own friends posted it on Facebook saying, "This is what it comes down to." Finally, love had been harnessed in the laboratory, seen, understood and broken into building blocks we could all apply to our lives.

The article proposes a recipe for becoming a love "master" instead of a love "disaster" by responding the right way to what Gottman calls your partner's "bids for connection." A "bid" is when your lover points out your kitchen window and marvels, "Look at that beautiful bird outside!" You could go "Wow!" and get binoculars (an active "turn-towards"); mumble "Huh," and keep reading your newspaper (a passive reaction, less good); or say, "I'm sick of your fucking birds. What about the broken garage door?" Gottman found that masters turn towards their partners' bids 87 percent of the time. Love, he concluded, comes down to "a habit of mind." And habits of mind take work to instill. Everyone at the workshop was given a kit in a box with a handle. Inside were decks of cards proposing questions to help us learn about our partners ("how are you feeling now about being a mother?") or offering ways to connect erotically ("when you return home tonight, greet each other with a kiss that lasts at least six seconds"). A manual provided us with a vocabulary to demystify and contain some of the scary things that go on in love: fights are "regrettable incidents," the things that make us feel good together are our "rituals of connection," the dark inner chasms that regrettable incidents seem to reveal are our "enduring vulnerabilities."

One of the Gottmans' employees, Kendra Han, estimated that a quarter of the couples in attendance were the kind of ickily self-aware duos who try this kind of thing for "fun and enrichment" while the majority were in some state of "relational distress." The prevailing mood was a mix of hope and fragility. "This is already not going well," I overheard one woman say, laughing a little. "My husband's late." As I watched the Gottmans from my own seat two rows from the stage, I felt anxious, too. I had come with my own love problem to solve. Some traditional Arab cultures believed that when you fall in love, your lover steals your liver. The ancient Chinese told their children that love could take out your heart. Romantic love, in older human cultures, was often something dark. It involved physical dissolution, the sense of falling apart. It made us act irrationally and tore a hole into the neatly woven fabric of our lives, beckoning us to step through it into a land of terrors. "You get lots of stories of getting tricked," William Jankowiak, an anthropologist who has extensively studied love in folktales, told me.

That's why, for much of human history, the marriage historian Stephanie Coontz writes, people thought lifelong partnership was "too important" to be left up to love. Marriage was a business contract. Families used it to acquire lands, to create stable legacies on which their next generations could build. Love resisted these kinds of reasoned considerations.

That all began to change in the West in the 1700s. The rise of wage labor freed young people from their families and gave them more autonomy to decide whom to marry. The Enlightenment put freedom of choice into vogue. The word "spinster" emerged, a pathetic figure compared to blissful women in love. Simon May, a British philosopher who has studied the development of beliefs about love over two millennia of Western culture, suggests that we've placed vastly more importance on finding love since the retreat of Christianity and the rise of relativism. "Human love," he writes in his magisterial *Love: A History*, "is widely tasked with achieving what once only divine love was thought capable of: to be our ultimate source of meaning and happiness, and of power over suffering and disappointment." The grounding we used to find in devotion to ideals like nationalism or communism, or in our faith in an ever-caring Shepherd, we now seek from individual, fickle human beings. After I read May's theory that love "is now the West's undeclared religion," I began to see evidence of it everywhere. "When you get down to it ... [love is] the only purpose grand enough for a human life," writes Sue Monk Kidd in *The Secret Life of Bees*. At funerals, we praise the way the deceased person loved as the ultimate sign that his life had meaning. Justice Anthony Kennedy, in his Supreme Court opinion legalizing gay marriage nationally, identified marriage as the ultimate wellspring of all the other essential human joys, from "expression" to "spirituality," while Sheryl Sandberg counsels young women that their choice of a mate is the most important decision of their lives. According to May, we no longer view love as "the rarest of exceptions," as older cultures did, "but as a possibility open to practically all who have faith in it."

These expectations are crazy-making, and it's no wonder scientists have jumped in to try to save us. In the 1930s, sociologists began to generate charts to try to predict what kinds of love marriages would last a lifetime. You could take your own personality traits—loves sewing circles?—and plot them against your beau's to forecast the happiness and stability of your match. Starting the '70s, with divorce on the rise, social psychologists got into the mix. Recognizing the apparently

opaque character of marital happiness but optimistic about science's capacity to investigate it, they pioneered a huge array of inventive techniques to study what things seemed to make marriages succeed or fail. They had partners write down everything they hated or loved about each other and then studied how close the pair subsequently sat together on a couch. They even generated fights, instructing couples to argue over how to pack the car for a vacation while each partner twiddled dials under the laboratory table assessing their mate's helpfulness. One study showed that couples who did novel things together fared better; another revealed that intense emotions, once believed to be a sign of immaturity in love, could be worked with to create very deep intimacy. Given how central our love partner had become to our well-being—research had begun to show a good marriage was more predictive of long-term health than eating right or not smoking—Sue Johnson of the Ottawa Couple and Family Institute told me she felt like she was “in the most exciting revolution that's happened in the 20th century for human beings.”

“Imagine proving all those poets and philosophers from way back wrong!” she said. “Finally, we can make sense of love and actually shape it with deliberation.” One recent afternoon, the Gottmans met me in their downtown Seattle office to talk about John's research and how they turned it into the Gottman Method. Julie was wearing a turquoise shirt and big earrings, her thick black curls streaked with a Susan Sontag ribbon of white. John, smaller and eagle-nosed, wore a black jacket and a yarmulke over a fringe of white hair. He'd brought his omnipresent scratch pad with him. “A few years after we'd married,” John began, “I wanted to leave for Chicago to take a job there. But Julie felt Chicago was too flat. And then we were in that canoe—” Julie interrupted him sharply. “Well, that came a bit later,” she said. “The real story here is we decided to offer a parenting support group. Remember that?” “Oh, yeah,” John deferred. “I forgot about that.” Seeing the Gottmans' marital interaction up close is almost alarming at first. Most couples tone down the perpetual spats, adjustments, sideways glances and hopeful asides that constitute one-on-one intimacy when they're in public. The Gottmans don't. Sitting across from them at a conference table, you feel as though you've come upon them tucked into bed, working it out with each other. They exchange constant meaningful looks. They interrupt each other, or Julie mostly interrupts John, correcting his behavior and memory. John accepts it. They use couples-therapy language. (“Boundaries!” Julie reminds John, when he starts speaking about his ex-

wife.) They openly refer to deep wounds in their relationship. They also snuggle. John puts his arm around Julie, she arches into him and they wrinkle their noses at each other. In my presence, Julie wept twice, once recounting a time John had made her feel like a bad mother and once when John said she had been “the answer to my prayers.” They started their parenting support group in 1989—just 10 couples, once a week, talking about the ups and downs of having children at the Seattle Jewish Community Center. John approached it like a lab. “He was all about observing and learning,” Julie said. “And I would jump in and talk about their emotions, looking for ways to try to help these parents. We'd have these great discussions afterwards and laugh about it. 'Why are you trying to help these people?' John would say. And I'd say, 'Honey, why are you not trying to help?'"

When John got his start researching couples in the mid-1970s, he was the one who needed help. He'd grown up in Brooklyn and New Jersey a diminutive nerd with few friends. As an adult, his love life felt perpetually unstable and unhappy. He found it hard to be satisfied with the woman he was with. In one two-year relationship, he and a girlfriend argued so much he ended up with stress-induced pneumonia. Psychology, which he studied at the University of Wisconsin, gave him a way to use his problem-solving mind to attack the question of his own loneliness. Like a science-fiction android who pins electrodes on his human subjects to try to figure out where their emotions come from, John set about creating experiments that were as broad as possible: What does a good relationship look like? What does it feel like to be in it? His career took off when he met a psychologist named Robert Levenson. Each man turned out to be exactly what the other had needed. Levenson was investigating the remarkable variance in how different people react to stress by testing their heart rates and sweat-gland activity after receiving a jolt. By teaming up with John, he says he finally felt as if he was working on something more “personally relevant and emotionally rich” than administering electric shocks. Meanwhile, by joining with Levenson, John thought he might uncover a way to measure marital happiness that was more “real” than people’s self-reporting on surveys. Their collaboration led John to create an actual mock apartment where couples could do “ordinary” things like cook and watch TV together. “It was just like being at a bed and breakfast,” he said, “except you were hooked up to electrodes ... and there were surveillance cameras hanging from the ceiling.” Then, he harnessed the emerging power of computers

to analyze a vast amount of data from the interactions. Professionals trained in interpreting facial expressions evaluated hours of video, rating the couples for emotions like delight, disgust and fear; assistants coded questionnaires the partners filled out about their relationship history for positive and negative feelings; and machines took constant measures of the couples' heart rates and vascular tone while they flirted and fought. Years afterwards, the psychologists followed up to see which couples were happy and which had split up. They plugged that information into a computer, along with all the data they'd previously gathered, and asked the machine to create equations that associated certain behaviors and physiology with long-term happiness. What emerged were fascinating and often surprising observations on lasting love. They found that couples that stay happy used a lot of "we," whereas couples that turned out unhappy used "I," "me" and "mine." They also discovered that when partners with a good long-term outlook argued, they somehow managed to maintain a ratio of *five positive comments* to one negative one. "At the time, everybody was enamored with this idea that romantic relationships were full of fireworks," Levenson remembered. "Well, that was not the finding. It is the capacity of couples to calm down, to soothe, to sort of reduce the level of arousal for each other, that is the most important factor in predicting whether the marriage will last." In the beginning, the two men's techniques were viewed as dangerously iconoclastic. "When Bob and I were assistant professors getting evaluated for tenure our committee said, 'Look, you guys are crazy. We can't predict *one* person's behavior. How are we going to predict two people's behavior? You'll never find anything. You'll never get a grant,'" John recalled. But as the astoundingly robust predictions started rolling in, all that changed. John got elected to chair the family psychology research unit of the American Psychological Association. The New York Times profiled his findings. Where John had once felt hopelessly bewildered by love, he began to feel as if he could eavesdrop on a couple sitting across from him in a restaurant and get a pretty good sense of their chances of divorce.

"John had these brilliant insights," Julie told me, "but nothing was being done with them." Unlike John, Julie's work as a psychologist had centered on therapeutic interventions. The daughter of a severely emotionally unstable mother, Julie started comforting others early. "In high school, I didn't have friends," she said. "I had a caseload." She specialized in individual and group therapy, not couples therapy, but she

was fascinated by her husband's research. She also knew that the majority of people who seek individual therapy want help with their relationships. From her divorce, she was familiar with the anguish produced by difficult love. She left that marriage with nothing but a Tibetan prayer rug, a sleeping bag and a cat.

Canoeing together on the Salish Sea outside Seattle, Julie remembers saying to John, "Why don't we try to help couples with what you know?" They spent the next year creating a master theory of good relationships based on John's research. He sat in his red chair, she sat on an ottoman. "We argued a lot," John remembered. "Oh, God, we argued a lot," Julie said. In the beginning, John was hesitant to embrace some of the ideas about love that Julie had picked up from her decades of practice as a therapist. "I thought, if there wasn't solid evidence, we wouldn't put it into the theory," he recalled. Always formula-driven, he imagined the Gottman Method would comprise a rigid set of 14 well-structured sessions. Julie wanted a looser set of guidelines. "I was tearing my hair out because I had worked with people for 20, 25 years, and I knew that there's huge variation in how people react to therapy," she said. She threw John a teasing smile. "He had to learn how to respect my knowledge. Finally."

They imagined that a happy relationship was built consecutively in seven layers. The foundation was a strong friendship, based on John's laboratory findings that couples who spoke more fluidly and in more detail about each other and their pasts were more likely to stay together. Then came sharing admiration, "turning towards" each others' bids and developing positive feelings about the coupling. Once that had all clicked into place, a pair could proceed through learning to manage their fights with, among other techniques, a process they dubbed "dreams within conflict," whereby people try to see the positive dream inside what looks like a partner's negative position. At the top—the pinnacle of a great relationship—came helping each others' dreams come true and building a shared sense of purpose, like volunteering or traveling the world. The "dreams with conflict" technique was inspired by the Gottmans' own marital strife. One fight involved Julie's wish, for her 50th birthday, to climb above Mount Everest's base camp with 10 female friends. "John gets altitude sick on a ladder," Julie said. He didn't want her to go. In bed at night, he'd pepper her with questions: "What if you get caught in a blizzard? What if you fall in a glacier? What if you get altitude sick?" "What if you get hit by a bus?" she'd

reply. Julie invited a sherpa to their house to give a presentation on the trip. The sherpa stood in the living room, 6 feet tall, dark and sexy, and showed slides of fabulous rope bridges snaking over river chasms as her friends ooh-ed and aah-ed. Afterwards, Julie asked John what he thought of the evening. “I don’t trust that sherpa” John recalled saying. But he came to realize what seemed like Julie’s peculiar urge to “sleep on rocks where there’s no air” stemmed from her yearning for far-flung adventure born from her difficult childhood. They also fought over whether to buy a second home. It was a priority for Julie to return to living in the forest, her childhood safe space. John initially refused. Over many “dreams within conflict” discussions, they discovered that John’s intransigence came from his own upbringing. His father, a rabbi, fled Vienna shortly before World War Two with “only some sugar and a lemon.” He counseled his son about the power of feeling free of possessions, including real estate, saying, “The only possessions you can count on are the ones inside your mind.”

Finally, after a year of bickering and breakthroughs, the Gottmans felt as if they’d perfected their method, and they took on a partner to help them turn it into a business. At first, they recruited participants to their workshops by posting fliers and placing pamphlets in therapists’ waiting rooms. But within a few years, such aggressive flogging wasn’t needed anymore. Crowds flocked to the workshops and, later, to the Gottmans’ online store, which offers products like a board game that takes you and your partner, represented by little plastic pieces, on a journey across painted cardboard through the steps to building a fulfilling relationship. “There’s so much more of a burden placed on marriage now to be your social support system,” Julie reflected. “People turned out to be starving for this knowledge.”

I could relate. I met my boyfriend in 2009 at a dinner party I’d thrown to impress somebody else. He came in late, beautiful in his crisp work clothes. The chemistry was immediate. Over a series of dates, I learned he was sweet and giving, with strong ethics and a fascinating mind. We lived on separate sides of the country where we resided at the time, and we had heady months of meeting in romantic towns in the middle, eating figs and cherries we bought straight off of farms, learning about ourselves as we were reflected in each other. Much of the time, I think we made each other feel more capable, more hopeful for the future. But there were also times when we made each other feel more confused than we’d ever been in our lives. The desire to love each other

was there, and yet it was with exasperation that we recognized we each sometimes didn't feel loved. What were we doing wrong? It didn't seem clear. During a difficult period this year, lingering at my laptop deep into the night, I found myself clicking on articles that promised to turn love into a formula. "15 Ways to Stay Married for 15 Years." "Ten Ways to Make Your Marriage Divorce-Proof." "Must-Know Guidelines for Dating an ISTJ." (Yes, I was desperate.) Like many people, I was particularly fascinated by a story in The New York Times called "To Fall in Love with Anyone, Do This." Based on work by Arthur Aron, a psychologist at Stony Brook University, the article proposed that love could be established if a pair of random people asked each other a specific set of 36 increasingly intimate questions ("Would you like to be famous? In what way?") and then silently stared into each other's eyes for four minutes. Two strangers paired for Aron's study actually ended up married six months later. It seemed to prove that love is a masterable technique rather than an uncontrollable force that often gives us pain. And people went wild for it. The article was viewed by more than 8 million people. Within weeks, Apple's App Store unveiled eight different apps based on it, one titled simply, "Fall in Love." And yet as fervently as I hoped one of these recipes would make my confused love life resolve itself, deep down I wasn't sure love could or should be built out of a manual, like something you assemble from IKEA. We live in an age that generally denies the possibility of the unpredictable. My and all my friends' unspoken goal is to live flawlessly plotted lives based on perfect self-knowledge. We have to-do lists and bucket lists and two-year, five-year and 20-year plans created with the help of therapists. One of my friends has jiggered his iPhone to blink him reminders of his "core values" all day long, so he won't even briefly swerve astray.

For me, though, love has been the thing that has broken me out of this dreary quest for perfection. We can only consciously construct what we can already imagine, which is very little. When I was 19 and living in Belgium, I happened to fall in love with a completely inappropriate man, a 33-year-old German pastor who wore white cigarette jeans like a '70s sitcom hustler and had spent his twenties bicycling around Europe. I never could have dreamed him up with the help of a therapist. That's what made loving him so life-altering. He was wild, irreverent, given to reading the Song of Solomon in bed and playing hooky from his internship at a theological seminary to take the train to a town he'd never heard of—in other words, nothing like the driven, well-scheduled East

Coasters I'd grown up with. And he touched those dormant qualities in myself. At the time, I wrote in a journal that being loved by him felt as if I'd been living in only three cramped rooms of the mansion that was my spirit, and then he came in with a big flashlight and led me by the hand through a warren of never-seen halls, laughing and tearing the sheets off the furniture while I trailed behind him, mouth agape. Of course, his alluring differences also bashed painfully up against my longing for a partner with whom I felt comfortable all the time. He was too old, he was too odd, he smoked too much; I agonized over the thought of introducing him to my parents. I felt at the time that forcing our relationship to "work" according to some norm would shatter it; it only worked insofar as it was broken, a queer, misshapen thing that just happened to rest beautifully atop the equally queer, misshapen circumstances that constituted our lives at 19 and 33.

Likewise, surfing the web for the solution that would bring my more recent relationship to heel, I feared we couldn't make it conform to an ideal template. A recent Quartz article insists that when choosing a life partner, we have to search for the right "eating companion for about 20,000 meals," "travel companion for about 100 vacations," "parenting partner" and "career therapist"—all while admitting that contemplating such a project "is like thinking about how huge the universe really is or how terrifying death really is." The author assures you, though, that using a spreadsheet will help you feel as if it's "fully in your control." I guess this is supposed to be empowering; I suspect it actually puts relationships under a kind of pressure beneath which many would crumble. My boyfriend and I came from very different countries, from different kinds of families. That we managed to love each other at all was already a miracle. When we imagine that every human life and every complex love can be molded to fit a scientifically derived ideal, we cover our eyes to the realities of circumstance—and shame people who can't manage to twist their circumstances to that ideal. Simon May, the philosopher who writes on love, told me that he's known people who were accused of basic psychological failings when they couldn't make their relationships work out. "But we have to take into account all the literature on unhappy love," he said. "I don't think it's just people getting it wrong or not trying hard enough." He called love an "earthly emotion" that often provokes restless feelings like tension and guilt, and suggested the assumption that every love affair can be managed denies the full humanity of our partners, their own "inscrutable and

uncontrollable” natures. They aren’t things we can program for maximum impact like a FitBit.

As I dug a little deeper into the work behind the love articles, I found that some of the people responsible for the science felt it held fewer definitive answers than we want to believe. One of them was Arthur Aron, the Stony Brook research psychologist whose work the Times glossed in “To Fall in Love with Anyone, Do This.” He was working at his second home in California when I called him. He laughed when I mentioned the Times story. He’d designed the 36 questions, he said, to artificially “create closeness” in a laboratory setting between same-sex heterosexual strangers, not lovers. One of his grad students had also tried the method on some heterosexual opposite-sex pairs, and one pair had, funny enough, fallen in love, but the lab hadn’t followed up with the others. Aron has studied love in many other experiments, and he’s been struck by how contextual factors influence relationships. “Unfortunately the single biggest [factor], if you look across the world, is stress,” he said. “If you’re very poor, if you’re in a crime-ridden neighborhood, it’s hard for any relationship to work out very well. That’s not one we can do much about as individuals.” Aron also pointed out that a lot of the science on happy love was based on averages, creating a norm away from which couples can stray very, very far and still be happy. Take a recent study claiming the ideal age to marry is between 25 and 34. The study reflects the center hump of a scattered group of dots representing pairs older and younger that all work in their own way. And the reporting on it outrageously inverts causation. The study’s authors mused that people who married younger might have been less settled, and those who waited until later might have been more “congenitally cantankerous,” upping their divorce rates. That doesn’t mean arbitrarily marrying in your late twenties would do anything whatsoever to improve your chances. And yet, I still read a story on Vox headlined, “Want to Avoid Divorce? Here’s the Best Age to Get Married.”

John Gottman designed his experiments to allow numerous variables to emerge, creating a much richer formula. But his findings were limited by the pool from which he drew his test subjects, communities in Illinois, Washington, Indiana and the San Francisco Bay Area with their own local habits. “There’s this sort of big mystery at the heart of things,” another psychologist told me. That psychologist was Robert Levenson—the same man with whom John had pioneered his

work. I reached him on the phone at Berkeley, where he now teaches. He and John are still close, and Levenson praised John's "fierce interest" in what makes marriages last. "It's not surprising that at the end of the day, after our research, he spent a significant part of his life working on interventions," Levenson reflected. But he wasn't so sure the actions he and John had observed happy couples performing could be turned into a do-it-at-home blueprint. "We actually don't know what got the happy couples to that point," he said. What makes two human beings want to turn towards each others' bids 87 percent of the time, give a shit about the fragile dreams hiding behind each others' most intransigent and frustrating opinions and have that magical effect on each other like a powerful chemical tranquilizer in the first place? This, he said, still "requires scientific study." Kendra Han, the workshop employee, admitted she doesn't follow up after couples leave the conference to see whether the method made them happier. Two studies conducted by the Gottmans show that the method really can move people along a happiness spectrum: A 2000 intervention given to already-healthy couples expecting a child revealed that it helped them weather the difficulties of becoming parents, and a 2013 Journal of Family Therapy study of 80 couples showed that most maintained gains in marital satisfaction a year after "The Art and Science of Love" workshop.

This is less definitive than the promise to transform disasters into masters, though, and the method wasn't directly compared to other therapies. Robert Levenson told me couples-therapy purveyors can be reluctant to do comparative studies, and gave a hypothetical example of why based on the finding that happy couples use "we" a lot. "What if I have the Levenson 'We' Therapy, where people come to my 'We' training and learn how to use 'We'?" he asked me. "Then I do a study and compare it with the Gottman approach and it turns out the Gottman approach does much better. But what about my 'We' building and my 'We' weekends and my 'We Retreat' at Club Med?" Back at the Gottman Method workshop, the 500 of us periodically broke out into pairs for exercises: 20 minutes to practice showing each other admiration, 30 to try to work through a serious problem that triggered our "enduring vulnerabilities." There were tip sheets to draw out of our kits: a master list of 100 adjectives to choose from when praising our partners—brave, reliable, hot—and a collection of lines to use when we're overwhelmed during arguments. I'm sorry, but I'm feeling flooded. Can we take 20? I'd come in skeptical. But not two hours into

the exercises, I found myself overwhelmed by emotion. All of the concepts were just abstract enough to find a specific analogue in my relationship. As I recognized my boyfriend's particular lovely qualities in the list of adjectives, I got a flush of warm and peaceful feelings, the kind John's laboratory research determined were necessary to support the calm physiology that underpins lasting love. A "love map" exercise got me to contemplate the gaps in our friendship and ways to fill them. The dreams-within-conflict exercise helped me understand the hopes for being a good dad that my boyfriend had vested in the ways he wanted to raise our future children.

In their lectures, the Gottmans performed the same quirky, vulnerable marital dynamic that I observed in my interview. In one memorable hour, they role-played a past "regrettable incident," first handling it in a bad way, then in a good way. As we all watched, John harshly criticized Julie for being too worried about their daughter's health. Julie slumped over the podium and actually cried. Then he started over with empathy, gently teasing out the issue from her personal history—the polio she contracted as a child due to her parents' neglect. As we saw the change on Julie's face, we all drew a breath. Suddenly, altering the trajectory of those terrible fights, the ones that can feel as though they're breaking our partnerships apart, seemed possible. We saw it happen. It's not hard to find people who vow that the Gottman Method completely transformed their relationships. Last month, I called one of the thousands of couples-therapy practices that use the Gottman Method, BestMarriages in southern British Columbia, and asked for referrals to couples who were willing to talk. Several pairs emailed me, eagerly requesting to be interviewed. Bonnie, 49, told me that she and her husband Brian, "definitely a disaster couple," were going to end their union, but a year of biweekly counseling in the Gottman Method "completely turned things around." Donald, 50, said he'd also given up on his 24-year marriage to Donna. There had been affairs; the two had drifted apart. But encountering the Gottmans' lingo—the "enduring vulnerabilities," the "rituals of connection," the "turning towards"—suddenly put meaning to the language-less, mysterious eddy of emotions that had been the relationship. It gave them things to do. Donald started sending Donna text messages every afternoon: "How was your day?" When he had a difficult encounter with a testy colleague, Donna shared her admiration for him, telling him how proud she was of him for handling it well. When Donna had a cold and

snored, the “old Don,” she said, would have roused her by “huffing and puffing with annoyance.” Instead, he employed the Gottmans’ patented “softened start-up,” waking her gently, expressing concern for her sore throat, and later sending her a note from work thanking her for rolling over to the other side of the bed.

Talking to them by video Skype, I never would have known the two had struggled. They cuddled up to one another in the frame and giggled like smitten high-schoolers as they retold the story of how they met. “We spotted each other,” Donna grinned, sticking her tongue out at Don. “She was on a balcony,” Donald said, smiling back. “It was like Romeo and Juliet.” I also got to watch Julie counsel a couple, Shantel and Paul, using the Gottman Method. The pair comes from a poorer neighborhood in Seattle, and they got free therapy in 2007 in exchange for agreeing to be filmed to help train other Gottman Method counselors. I’d intended to dip in just for a few minutes to get a sense of how Julie worked. But I ended up viewing six hours of the counseling in one afternoon, transfixed. Though Paul and Shantel could hardly have seemed less like me and my partner in their particulars—they had children; a low ebb in their relationship occurred after Paul got shot—so much of the by-turns-playful-and-reproachful dance that they did with each other on Julie’s couch reminded me of my own relationships: the flirty exchanges, the deep concern for each other, the subtle digs at each others’ flaws, the sudden flares of anger as they touched each other on open wounds. Shantel wept as she recounted how Paul criticized her; Paul cried himself as he recalled being abandoned by his godmother and how he fears Shantel’s rejection.

I called Shantel in late July. Like the other couples I spoke to, she reckoned the Gottman Method “kept us married.” Since they’d met as young teens, she and Paul had basically been each other’s only ports in an incredibly stormy world. In his teens, Paul got involved in the drug trade; later, the pair got caught up in the predatory lending crisis and briefly became homeless. Add to that the fact that they had not selected each other to ride out this turmoil on the basis of a problem-solving-compatibility survey but on love, which often, like a trickster determined to upend our tidy plans, draws opposites together and, by reminding us of our emotionally fraught childhood bonds with our parents, brutally reveals just how vulnerable and childlike we really still are. Add to that the fact that our culture teaches us to expect love to “feel right,” to feel like a peaceful resolution rather than an adventure, to feel as calm as

faith. “Every time we got into a huge argument, we thought it must not be ‘meant to be,’” Shantel said. Julie’s techniques gave them a way to navigate the astounding complexity that is a marriage based on love. “One of the biggest things is being able to notice when we are ‘flooded’ and when we are at a place we can’t even engage and giving each other that space,” she told me. “We love telling each other when we’re ‘turning towards’ each other. ‘Hey, I’m making an attempt here to turn towards you. What I did was wrong. It was unfair.’ And the other person is receptive to that because we both have an understanding of what it means.”

In private, the Gottmans are much more nuanced on the impossibility of healing some relationships than they are in public. “Sometimes, really, people’s dreams don’t mesh,” John reflected. “There are all kinds of reasons why therapy can fail.” I got the sense they deeply care about couples in pain—they asked me several times about my own relationship. Their promise that mastering love is possible is, in part, an effort to comfort couples enmeshed in terrifying complexity. “Even if you can give somebody one little nugget of something they can take in, it’s helpful,” Julie said. I still don’t quite know what’s going to happen with my relationship. But I left the workshop wanting to try the Gottmans’ techniques. They brought to mind a line from Cormac McCarthy’s *Blood Meridian*: “The truth about the world, he said, is that anything is possible. ... Even in this world more things exist without our knowledge than with it and the order in creation which you see is that which you have put there, like a string in a maze, so that you shall not lose your way.” The new love science may be just a string in the increasingly huge and windy maze that is contemporary love, no more absolute than all the other ways of thinking about love we’ve invented over 50,000 years—but we need that string.

Before I left Seattle, the Gottmans invited me out to their home on Orcas, the forested island off the northwest Washington coast. A giant silver sculpture of a heart invites visitors down a steep, wooded path towards the sea. The house’s interior is a wondrous world unto itself: wood carvings, ochre-and-sienna Native American-inspired throw blankets, shelves and shelves of books, a wooden dining-room table painted with playful injunctions. Enjoy the fruits of your labors. Open your mind. Seek knowledge. Seize the day. Cherish the night. “It’s mostly Julie,” John said proudly as we tucked our feet into sheepskin slippers. “She’s a frustrated architect.” He stopped in front of a huge oil

portrait just off the foyer depicting the two Gottmans together, smiling and leaning into each other. A friend had painted it. “I love this because it really captures our relationship,” he said. He paused for a moment before the painting as if to take it in anew. Settling into their brown couches, I asked John and Julie if they felt the pain depicted in the millennia of literature on love, the ups and downs and the sense of bewilderment we now try to manage, was somehow necessary, or if better science could increase our skill at love such that we wouldn’t have to go through such torment anymore.

Both fell silent for 20 seconds. “I think the pain has to do with balance, and how difficult it is to balance between attending to your partner’s needs and staying true to who you are,” Julie said. “I have a different answer,” John said. “I don’t think it’s necessary. When you haven’t been able to build trust, there’s the constant sense that this person isn’t there for you. They’re there for themselves but not for you. But we now know that there are really systematic processes through which people build trust and commitment.” Recently, he’d been working on the mathematics of building trust in relationships based on John Nash’s concept of the cooperative equilibrium, where two players in a game seek the best possible outcome for both of them. But he also acknowledged that his painful younger relationships were steps on the path to Julie, showing him what he really wanted and how he needed to change. Julie said the same of her first marriage. If everybody involved had known then what you know now about how to build a good relationship, I asked, could you have made your earlier marriages work? “No,” Julie said. “I don’t think so,” John said.

There’s another way to tell the story of how John and Julie fell in love, one that brings to the fore not the scientifically based steps by which they built their coupledness but rather the awesome workings of destiny. I got the sense this story was more important to them than the other one. Revealing it, they curled closer together on the couch, Julie nestling her head into the crook of John’s neck, John massaging her leg. Two years before she met John, Julie said, she’d had a vision of the man she would spend her life with. Her vision had shown the man from behind. When John got up from the table to pay the bill on their first date at the Pony Espresso, and turned around, she felt a shock so sudden it left her trembling: It was him, the man from her vision. Later, she came to believe fate had brought them together for the higher purpose of helping couples: “I see our predestiny, the sacred holiness, as to do this little tiny bit of healing as tikkun olam”—Jews’ duty to

repair the world. Julie's scientist brain knows that feelings of intense attraction come down to hormones and pheromones, but, she said, "I don't know how to put that together with the fact that I had this vision of him." Perhaps, someday, a scientifically observable process will allow us to understand exactly what it is, that sense of mysterious destiny we can find in other people, not created but seemingly sent from on high. But is that a world in which we'd actually want to live?

John smiled as he recounted the puzzling sensation he experienced that evening in the Pony Expresso, similar to Julie's. He'd been unhappy for decades. In the months before that encounter, he said he'd gone on 60 dates, trying to establish a "database" of women to choose from. And then he met Julie and felt unaccountably whole. "I've never felt alone since," he said. "Oh, sweetie," Julie murmured. "You're going to make me cry."

Adapted from The Huffington Post.