# ПРИМЕЧАНИЯ

Собирая материал для этой книги, я проанализировал около четырех тысяч единиц рецензированной научной литературы. Если бы это была научная книга, большинство работ были бы указаны в тексте по мере их упоминания, вместе со ссылкой на справочно-библиографический раздел. Однако мой собственный опыт в качестве читателя научно-популярной литературы говорит о том, что наличие в тексте многочисленных скобок с именами исследователей только отвлекает внимание от созданной автором целостной истории. Я составил эти примечания, чтобы поддержать фактами, например статистическими данными о распространенности того или иного заболевания, свои утверждения, а также эксперименты (с инверсионными очками), чтобы заинтересованные читатели могли глубже изучить эти вопросы. В каждом случае я старался ссылаться на работы, связанные с темой книги; как правило, это метаанализ или обзор, охватывающий сотни статей, а не серия эмпирических работ, которые легли в основу обзора.

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# ВВЕДЕНИЕ

- 1 N. Bakalar, "Lack of Sleep Tied to Diabetes in Pregnancy," The New York Times, October 18, 2017, http://www.nytimes.com.
- 2 D. Quenqua, "Can Fathers Have Postpartum Depression?," The New York Times, October 17, 2017, http://www.nytimes.com.
- 3 B. James et al., "Contribution of Alzheimer Disease to Mortality in the United States," Neurology 82, no. 12 (2014): 1045–1050.

- 4 Возможно, это несколько запутанная формулировка, но, если анализировать ситуацию с начала жизни, с момента рождения, коэффициенты риска будут именно такими. Очевидно, что, если вы подвергаетесь влиянию внешних факторов, таких как воздействие токсинов или многочисленные удары по голове, которые в конечном счете вызывают болезнь Альцгеймера, в вашем случае риск вырастает до 100 процентов. Klodian Dhana, Denis A. Evans, Kumar B. Rajan, David Bennett, and Martha Clare Morns, Impact of Healthy Lifestyle Factors on the Risk of Alzheimer's Dementia: Findings from Two Prospective Cohort Studies, Alzheimer's Association International Conference, Los Angeles, July 14, 2019; I. E. Jansen et al., "Genome-wide Meta-analysis Identifies New Loci and Functional Pathways Influencing Alzheimer's Disease Risk," Nature Genetics 5, no. 3 (2019): 404–413.
- 5 P. Eikelenboom et al., "Whether, When and How Chronic Inflammation Increases the Risk of Developing Late-Onset Alzheimer's Disease," Alzheimer's Research and Therapy 4, no. 3 (2012): 15, http://dx.doi.org/10.1186/alzrt118.
- 6 Eikelenboom et al., "Whether, When and How Chronic Inflammation"; D. J. Marciani, "Development of an Effective Alzheimer's Vaccine," in Immunology, vol. 1, Immunotoxicology, Immunopathology, and Immunotherapy, ed. M. A. Hayat, pp. 149–169 (London: Elsevier, 2018).
- 7 M. J. Meaney and M. Szyf, "Environmental Programming of Stress Responses through DNA Methylation: Life at the Interface between a Dynamic Environment and a Fixed Genome," Dialogues in Clinical Neuroscience 7, no. 2 (2005): 103–123.
- 8 Прямые и непрямые цитаты взяты из: L. Warwick, "Dr. Michael Meaney: More Cuddles, Less Stress!," Bulletin of the Centre of Excellence for Early Childhood Development, October 2005, https://www.researchgate.net/profile/Cindy-Mason-2/publication/243055339\_morecuddles-meaney/links/0deec51cf6447827f5000000/morecuddles-meaney.pdf.
- 9 Stone, A. A., Schwartz, J. E., Broderick, J. E., & Deaton, A. (2010). A snapshot of the age distribution of psychological well-being in the United States. Proceedings of the National Academy of Sciences, 107(22), 9985-9990.

- 1 S. E. Hampson, "Personality Development and Health," in The Handbook of Personality Development, ed. D. McAdams, R. Shiner, and J. Tackett, pp. 489–502 (New York: Guilford Press, 2019).
- 2 Hampson, "Personality Development and Health."
- 3 S. E. Hampson et al., "Lifetime Trauma, Personality Traits, and Health: A Pathway to Midlife Health Status," Psychological Trauma: Theory, Research, Practice, and Policy 8, no. 4 (2016): 447–454, http://dx.doi.org/10.1037/tra0000137.
- 4 H. S. Friedman et al., "Does Childhood Personality Predict Longevity?," Journal of Personality and Social Psychology 65, no. 1 (1993): 176–185, http://dx.doi. org/10.1037/0022-3514.65.1.176.
- 5 W. Bleidorn, "What Accounts for Personality Maturation in Early Adulthood?," Current Directions in Psychological Science 24, no. 3 (2015): 245–252; G. W.

- Edmonds et al., "Personality Stability from Childhood to Midlife: Relating Teachers' Assessments in Elementary School to Observer-and Self-Ratings 40 Years Later," Journal of Research in Personality 47, no. 5 (2013): 505–513; N. W. Hudson and R. C. Fraley, "Volitional Personality Trait Change: Can People Choose to Change Their Personality Traits?," Journal of Personality and Social Psychology 109, no. 3 (2015): 490–507.
- 6 N. Bayley, "The Life Span as a Frame of Reference in Psychological Research," Vita Humana 6, no. 3 (1963): 125–139.
- 7 P. B. Baltes and K. W. Schaie, "On Life-Span Developmental Research Paradigms: Retrospects and Prospects," in Life-Span Developmental Psychology (Cambridge, MA: Academic Press, 1973), pp. 365–395.
- 8 B. P. Chapman, S. Hampson, and J. Clarkin, "Personality-Informed Interventions for Healthy Aging: Conclusions from a National Institute on Aging Workgroup," Developmental Psychology 50, no. 5 (2014): 1426–1441.
- 9 C. DeYoung, "Personality Neuroscience and the Biology of Traits," Social and Personality Psychology Compass 4, no. 12 (2010): 1165–1180, http://dx.doi.org/10.1111/j.1751-9004.2010.00327.
- 10 "A Super Brief and Basic Explanation of Epigenetics for Total Beginners," What Is Epigenetics, July 30, 2018, www.whatisepigenetics.com/what-is-epigenetics/.
- 11 R. Gajewski, "Jason Alexander: 'Seinfeld' Killed Off Susan Because Actress Was 'F—ing Impossible' to Work With," Hollywood Reporter, June 4, 2015, https://www.hollywoodreporter.com/live-feed/jason-alexander-seinfeld-killed-susan-800031.
- 12 L. A. Zebrowitz and J. M. Montepare, "Social Psychological Face Perception: Why Appearance Matters," Social and Personality Psychology Compass 2, no. 3 (2008): 1497–1517; P. Belluck, "Yes, Looks Do Matter," The New York Times, April 24, 2009, p. ST1.
- 13 W. Terrill and S. D. Mastrofski, "Situational and Officer-Based Determinants of Police Coercion," Justice Quarterly 19, no. 2 (2002): 215–248.
- 14 C. Gibson, "Scientists Have Discovered What Causes Resting Bitch Face," The Washington Post, February 2, 2016, https://www.washingtonpost.com.
- 15 Из личного общения с Льюисом Голдбергом, 1994 год; см. также: L. R. Goldberg, "Language and Individual Differences: The Search for Universals in Personality Lexicons," Review of Personality and Social Psychology 2, no. 1 (1981): 141–165.
- 16 Goldberg, "Language and Individual Differences."
- 17 J. M. Murphy, "Psychiatric Labeling in Cross-Cultural Perspective," Science 191, no. 4231 (1976): 1019–1028.
- 18 G. W. Allport and H. S. Odbert, "TraitNames: A Psycho-Lexical Study," Psychological Monographs 47, no. 1 (1936): 1–171; J. S. Wiggins, Paradigms of Personality Assessment (New York: Guilford Press, 2003); из личного общения с Льюисом Голдбергом 8 августа 2018 года.
- 19 L. R. Goldberg, "What the Hell Took So Long? Donald Fiske and the Big-Five Factor Structure," in Personality Research, Methods, and Theory: A Festschrift Honoring Donald W. Fiske, ed. P. E. Shrout and S. K. Fiske, pp. 29–43 (Hillsdale, NJ: Erlbaum, 1995).

- 20 L. R Goldberg, "The Structure of Phenotypic Personality Traits," American Psychologist 48, no. 1 (1993): 26–34.
- 21 G. Saucier, "Openness versus Intellect: Much Ado about Nothing?," European Journal of Personality 6 (1992): 381–386.
- 22 L. R. Goldberg, "The Development of Markers for the Big-Five Factor Structure," Psychological Assessment 4, no. 1 (1992): 26.
- 23 L. R. Goldberg, "A Broad Bandwidth, Public Domain, Personality Inventory Measuring the Lower-Level Facets of Several Five-Factor Models," in Personality Psychology in Europe, vol. 7, ed. I. Mervielde et al., pp. 7–28 (Tilburg, The Netherlands: Tilburg University Press, 1999); L. R. Goldberg et al., "The International Personality Item Pool and the Future of Public-Domain Personality Measures," Journal of Research in Personality 40 (2006): 84–96.
- 24 Льюис Голдберг отмечает, что лишь немногие крупные исследования обнаружили фактор «Открытость опыту». Специалист по психологии личности Роберт Маккрей написал статью, в которой идет речь о том, что в английском лексиконе очень мало слов для обозначения открытости. Тем не менее в данном случае многие ученые, изучающие психологию личности, предпочитают этот термин «интеллекту», объясняя это тем, что первый больше подходит для обозначения личностного качества, тогда как второй имеет отношение к умственному развитию, которое можно измерить с помощью теста на определение умственных способностей.
- 25 Возможно, в других книгах вы видели эту модель под названиями модель OCEAN или модель CANOE. В них те же пять факторов перечисляются в другом порядке, а вместо эмоциональной устойчивости используется ее противоположность невротизм.
- 26 DeYoung, "Personality Neuroscience."
- 27 DeYoung, "Personality Neuroscience."
- 28 B. C. Trumble et al., "Successful Hunting Increases Testosterone and Cortisol in a Subsistence Population," Proceedings of the Royal Society of London B: Biological Sciences 281, no. 1776 (2014): 20132876.
- 29 G. Saad and J. G. Vongas, "The Effect of Conspicuous Consumption on Men's Testosterone Levels," Organizational Behavior and Human Decision Processes 110, no. 2 (2009): 80–92.
- 30 S. M. Van Anders, J. Steiger, and K. L. Goldey, "Effects of Gendered Behavior on Testosterone in Women and Men," Proceedings of the National Academy of Sciences 112, no. 45 (2015): 13805–13810.
- 31 DeYoung, "Personality Neuroscience."
- 32 X. Gonda et al., "Association of the S Allele of the 5-HTTLPR with Neuroticism-Related Traits and Temperaments in a Psychiatrically Healthy Population," European Archives of Psychiatry and Clinical Neuroscience 259, no. 2 (2009): 106–113.
- 33 J. T. Nigg, "Temperament and Developmental Psychopathology," Journal of Child Psychology and Psychiatry 47, nos. 3–4 (2006): 395–422.
- 34 M. K. Rothbart, "Temperament, Development, and Personality," Psychological Science 16, no. 4 (2007): 20–26.

- 35 M. I. Posner, M. K. Rothbart, and B. E. Sheese, "Attention Genes," Developmental Science 10 (2007): 24–29.
- 36 H. E. Fisher et al., "Four Broad Temperament Dimensions: Description, Convergent Validation Correlations, and Comparison with the Big Five," Frontiers in Psychology 6 (2015): 1098.
- 37 B. W. Roberts, K. E. Walton, and W. Viechtbauer, "Patterns of Mean-Level Change in Personality Traits across the Life Course: A Meta-Analysis of Longitudinal Studies," Psychological Bulletin 132, no. 1 (2006): 1–25. Прочитав главу 21, Сара Хэмпсон сделала такую оговорку: «Мне нравится оптимистичная идея о том, что личность меняется, а значит, мы можем развиваться. Я верю в это, но мне придется также признать, что наши выводы по "гавайскому проекту" (влияние личности ребенка на состояние здоровья 40 лет спустя независимо от влияния личности взрослого) ставят под сомнение эту точку зрения. Что мы можем сделать во взрослой жизни, если мы были почти неуправляемыми, недобросовестными детьми? Ранние факторы могли оказать долговременное негативное воздействие на наше здоровье. Будучи взрослыми, мы как минимум можем постараться быть добросовестными и благодаря этому делать все для того, чтобы решить свои проблемы со здоровьем, возможно, проистекающие из детства, — например, компенсировать это ведением здорового образа жизни. ... Текущий этап "гавайского проекта" посвящен изучению личности и нарушения когнитивных функций, а результаты прошлых исследований указывают на то, что личность оказывает значительное влияние на когнитивную устойчивость. Мы надеемся, что нам удастся предсказать умеренное снижение когнитивных функций по сравнению с предшествующей личностью и, возможно, по сравнению с предыдущим изменением личности».
- 38 B. W. Roberts and D. Mroczek, "Personality Trait Change in Adulthood," Current Directions in Psychological Science 17, no. 1 (2008): 31–35.
- 39 R. Helson, C. Jones, and V. S. Kwan, "Personality Change over 40 Years of Adulthood: Hierarchical Linear Modeling Analyses of Two Longitudinal Samples," Journal of Personality and Social Psychology 83, no. 3 (2002): 752.
- 40 Roberts, Walton, and Viechtbauer, "Patterns of Mean-Level Change."
- 41 Helson, Jones, and Kwan, "Personality Change over 40 Years"; Roberts, Walton, and Viechtbauer, "Patterns of Mean-Level Change."
- 42 Roberts and Mroczek, "Personality Trait Change in Adulthood"; W. Bleidorn, "What Accounts for Personality Maturation?"
- 43 Bleidorn, "What Accounts for Personality Maturation?"
- 44 Roberts, Walton, and Viechtbauer, "Patterns of Mean-Level Change in Personality Traits."
- 45 R. R. McCrae et al., "Age Differences in Personality across the Adult Life Span: Parallels in Five Cultures," Developmental Psychology 35, no. 2 (1999): 466.
- 46 D. P. McAdams, "The Psychological Self as Actor, Agent, and Author," Perspectives on Psychological Science 8, no. 3 (2013): 272–295.
- 47 K. Peveto, "101-Year-Old Baton Rouge Runner Earns World Record, and a New Nickname, at National Senior Games," The Advocate, July 2, 2017, https://www.theadvocate.com.

- 48 J. McCoy, "Meet Julia Hawkins, the 101-Year-Old Who Has Recently Taken Up Competitive Running," Runner's World, March 24, 2017, https://www.runnersworld.com/runners-stories/a20851266/meet-julia-hawkins-the-101-year-old-who-has-recently-taken-up-competitive-running/.
- 49 L. Bonos, "Jane Fonda and Lily Tomlin on 'Grace and Frankie,' Aging in Hollywood and Female Sexuality," The Washington Post, March 28, 2017, https://www.washingtonpost.com/news/soloish/wp/2017/03/28/jane-fonda-and-lily-tomlin-on-grace-and-frankie-aging-in-hollywood-and-female-sexuality/?utm term=.77d6c3821fc8.
- 50 David Emery, "The Life of Colonel Sanders," Snopes, December 2, 2016, https://www.snopes.com/fact-check/colonel-sanders/.
- 51 "Jim Bakker PTL Club with Colonel Sanders 1979," posted by PTL Club TV, November 20, 2011, https://www.youtube.com/watch?v=ttdTGPQer-o.
- 52 S. E. Hampson et al., "Childhood Conscientiousness Relates to Objectively Measured Adult Physical Health Four Decades Later," Health Psychology 32, no. 8 (2013): 925.
- 53 Chapman, Hampson, and Clarkin, "Personality Informed Interventions."
- 54 Из личного общения с Чарльзом Кохом 22 июля 2017 года.
- 55 H. G. Welch and W. C. Black, "Overdiagnosis in Cancer," Journal of the National Cancer Institute 102 (2010): 605–613; H. G. Welch, L. Schwartz, and S. Woloshin, Overdiagnosed: Making People Sick in the Pursuit of Health (Boston: Beacon, 2011).
- 56 F. Strack, L. L. Martin, and S. Stepper, "Inhibiting and Facilitating Conditions of the Human Smile: A Nonobtrusive Test of the Facial Feedback Hypothesis," Journal of Personality and Social Psychology 54 (1988): 768–777; T. L. Kraft and S. D. Pressman, "Grin and Bear It: The Influence of Manipulated Facial Expression on the Stress Response," Psychological Science 23, no. 11 (2012): 1372–1378.
- 57 Из личного общения с Тхуптен Джинпа Лангри в апреле 2018 года.
- 58 J. Oliver, "Tibetan Sovereignty Debate and Human Rights in Tibet," Last Week Tonight with John Oliver, produced by J. Oliver, aired March 5, 2017, HBO.
- 59 "Dalai Lama's Guide to Happiness," posted by A Million Smiles, October 8, 2013, https://www.youtube.com/watch?v=IUEkDc\_LfKQ.
- 60 R. Helson, C. Jones, and V. S. Kwan, "Personality Change over 40 Years."
- 61 S. J. Lupien et al., "Increased Cortisol Levels and Impaired Cognition in Human Aging: Implication for Depression and Dementia in Later Life," Reviews in the Neurosciences 10, no. 2 (1999): 117–140.

- 1 Из личного общения с Джорджем Мартином 17 сентября 1993 года.
- 2 A. J. O. Dede and C. N. Smith, "The Functional and Structural Neuroanatomy of Systems Consolidation for Autobiographical and Semantic Memory," in Behavioral Neuroscience of Learning and Memory, Current Topics in Behavioral Neurosciences, vol. 37, ed. R. E. Clark and S. Martin (Cham, Switzerland: Springer, 2016); M. Moscovitch et al., "Functional Neuroanatomy of Remote Episodic, Semantic and Spatial Memory: A Unified Account Based on Multiple Trace Theory," Journal

- of Anatomy 207, no. 1 (2005): 35–66; B. Milner, S. Corkin, and H. L. Teuber, "Further Analysis of the Hippocampal Amnesic Syndrome: 14-Year Follow-Up Study of HM," Neuropsychologia 6, no. 3 (1968): 215–234.
- 3 Dede and Smith, "Functional and Structural Neuroanatomy"; Moscovitch et al., "Functional Neuroanatomy."
- 4 Я писал об этом ранее в книге D. J. Levitin, The Organized Mind. (New York: Dutton, 2014). (*Левитин Д*. Организованный ум. Как мыслить и принимать решения в эпоху информационной перегрузки. М.: Манн, Иванов и Фербер, 2019.)
- 5 M. S. Gazzaniga, Who's in Charge: Free Will and the Science of the Brain (New York: Ecco, 2012). (*Газзанига М.* Кто за главного? Свобода воли с точки зрения нейробиологии. М.: ACT, CORPUS, 2017.)
- 6 D. J. Levitin, "Absolute Memory for Musical Pitch: Evidence from the Production of Learned Melodies," Perception & Psychophysics 56, no. 4 (1994): 414–23.
- 7 См., например: D. L. Hintzman and R. A. Block, "Repetition and Memory: Evidence for a Multiple-Trace Hypothesis," Journal of Experimental Psychology 88, no. 3 (1971): 297; D. L. Hintzman, "Judgments of Frequency and Recognition Memory in a Multiple-Trace Memory Model," Psychological Review 95, no. 4 (1988): 528; S. D. Goldinger, "Echoes of Echoes? An Episodic Theory of Lexical Access," Psychological Review 105, no. 2 (1998): 251.
- 8 D. L. Hintzman, "'Schema Abstraction' in a Multiple-Trace Memory Model," Psychological Review 93, no. 4 (1986): 411.
- 9 Moscovitch et al., "Functional Neuroanatomy"; B. R. Postle, "The Hippocampus, Memory, and Consciousness," in The Neurology of Consciousness, 2nd ed., ed. S. Laureys, O. Gosseries, and G. Tononi (San Diego, CA: Elsevier, 2016).
- 10 J. D. Wammes, M. E. Meade, and M. A. Fernandes, "The Drawing Effect: Evidence for Reliable and Robust Memory Benefits in Free Recall," Quarterly Journal of Experimental Psychology 69, no. 9 (2016): 1752–1776.
- 11 Из личного общения с Джеком Вайнштейном 25 апреля 2018 года, Бруклин (Нью-Йорк).
- 12 Из личного общения со Стивом Косслином 8 сентября 2012 года.
- 13 Из личного общения с Джони Митчелл 9 сентября 2012 года.
- 14 Из личного общения с Джорджем Шульцом 31 марта 2018 года, Стэнфорд (Калифорния).
- 15 Из личного общения с Джеффри Кимбаллом 3 марта 2018 года, Лос-Анджелес (Калифорния).
- 16 Из личного общения с Соней Люпьен 13 марта 2019 года, Монреаль (Квебек),.
- 17 S. Sindi et al., "When We Test, Do We Stress? Impact of the Testing Environment on Cortisol Secretion and Memory Performance in Older Adults," Psychoneuroendocrinology 38, no. 8 (2013): 1388–1396; S. Sindi et al., "Now You See It, Now You Don't: Testing Environments Modulate the Association between Hippocampal Volume and Cortisol Levels in Young and Older Adults," Hippocampus 24, no. 12 (2014): 1623–1632. В более естественных условиях общие показатели точности у молодых и пожилых людей не отличались: D. Davis, N. Alea, and S. Bluck, "The Difference between Right and Wrong: Accuracy

of Older and Younger Adults' Story Recall," International Journal of Environmental Research and Public Health 12, no. 9 (2015): 10861–10885. Авторы одного исследования пришли к выводу, что во время лабораторного тестирования люди преклонного возраста испытывают не больший стресс, чем молодые люди, но они не оценивали стресс непосредственно и не измеряли уровень кортизола: A. Ihle et al., "Adult Age Differences in Prospective Memory in the Laboratory: Are They Related to Higher Stress Levels in the Elderly?," Frontiers in Human Neuroscience 8 (2014): 1021.

- 18 B. M. Ben-David, G. Malkin, and H. Erel, "Ageism and Neuropsychological Tests," in Contemporary Perspectives on Ageism, ed. Liat Ayalon and Clemens Tesch-Römer, pp. 277–297 (Cham, Switzerland: Springer, 2018).
- 19 M. A. Shafto et al., "On the Tip-of-heTongue: Neural Correlates of Increased Word-Finding Failures in Normal Aging," Journal of Cognitive Neuroscience 19, no. 12 (2007): 2060–2070.

# ГЛАВА 2,5

- 1 S. Innes, "Review of The Cambridge Introduction to Emmanuel Levinas by Michael Morgan," Religious Studies 48, no. 4 (2012): 552–557, http://www.jstor.org/stable/23351460.
- 2 L. K. Jones, "Neurophysiological Development across the Lifespan," in Neurocounseling: Brain-Based Clinical Approaches, ed. T. A. Field, L. K. Jones, and L. A. Russell-Chapin (Alexandria, VA: John Wiley & Sons, 2017).
- 3 Я благодарен Дэну Кауфману из DARPA за формулировку этой идеи. Из личного общения с Дэном Кауфманом 14 июля 2018 года.
- 4 Center on the Developing Child, "Five Numbers to Remember about Early Childhood Development," brief, 2009, www.developingchild.harvard.edu.
- 5 E. Santos and C. A. Noggle, "Synaptic Pruning," in Encyclopedia of Child Behavior and Development, ed. S. Goldstein and J. A. Naglieri (Boston: Springer, 2011).
- 6 https://ghr.nlm.nih.gov/primer/basics/gene.
- 7 K. Wong, "Tiny Genetic Differences between Humans and Other Primates Pervade the Genome," Scientific American, September 1, 2014, https://www.scientificamerican.com/article/tiny-genetic-differences-between-humans-and-other-primates-pervade-the-genome/.
- 8 Я осторожно использую термины «статистический вывод» и «статистический анализ». Как именно мозг осваивает такие сложные вещи, как язык, вопрос спорный. Существует мнение, что мозг имеет модульную структуру и некоторые из этих модулей «запрограммированы». Такой термин можно встретить как в научных статьях, так и в научно-популярной литературе. Некоторые считают, что мозг имеет генетическую предрасположенность, но опыт формирует ее, а также что «запрограммированный» это слишком сильно сказано. Здравомыслящие ученые не согласны с таким утверждением. Необходимо просто подождать, когда будет проведено больше экспериментов и получено больше данных.

- 9 "Entrevista a Evan Balaban. CASEIB 2010". (Интервью с Эваном Балабаном, размещенное UC3M 21 декабря 2010 года. https://www.youtube.com/watch?v=sIqD98W9k64.)
- 10 W. James, The Principles of Psychology (London: MacMillan, 1890).
- 11 B. Brogaard, "Serotonergic Hyperactivity as a Potential Factor in Developmental, Acquired and Drug-Induced Synesthesia," Frontiers in Human Neuroscience 7 (2013): 657.
- 12 L. K. Low and H. J. Cheng, "Axon Pruning: An Essential Step Underlying the Developmental Plasticity of Neuronal Connections," Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences 361 (2006): 1531–1544.
- 13 Low and Cheng, "Axon Pruning."
- 14 Z. Petanjek et al., "Extraordinary Neoteny of Synaptic Spines in the Human Prefrontal Cortex," Proceedings of the National Academy of Sciences 108, no. 32 (2011): 13281–13286.
- 15 Я благодарен Майклу Газзанига за эти вычисления.
- 16 Из личного общения с Майклом Газзанигой 15 июля 2018 года.
- 17 I. Maddieson and K. Precoda, UCLA Phonological Segment Inventory Database (UPSID), n.d., http://web.phonetik.uni-frankfurt.de/upsid\_info.html; S. Shih, personal communication, August 7, 2018.
- 18 O. T. Giles et al., "Hitting the Target: Mathematical Attainment in Children Is Related to Interceptive-Timing Ability," Psychological Science 29, no. 8 (2018): 1334–1345.
- 19 J. K. Niparko et al., "Spoken Language Development in Children following Cochlear Implantation," Journal of the American Medical Association 303 (2010): 1498–1506; J. G. Nicholas and A. E. Geers, "Sensitivity of Expressive Linguistic Domains to Surgery Age and Audibility of Speech in Preschoolers with Cochlear Implants," Cochlear Implants International 19, no. 1 (2018): 26–37.
- 20 M. L. Hall et al., "Auditory Access, Language Access, and Implicit Sequence Learning in Deaf Children," Developmental Science 21, no. 3 (2018): e12575.
- 21 A. K. Bhatara, E. M. Quintin, and D. J. Levitin, "Musical Ability and Developmental Disorders," The Oxford Handbook of Intellectual Disability and Development (New York: Oxford University Press, 2012), 138.
- 22 H. J. Lee et al., "Transgenerational Effects of Paternal Alcohol Exposure in Mouse Offspring," Animal Cells and Systems 17, no. 6 (2013): 429–434; J. Day et al., "Influence of Paternal Preconception Exposures on Their Offspring: Through Epigenetics to Phenotype," American Journal of Stem Cells 5, no. 1 (2016): 11.
- 23 На странице Animal Lovers Only в Facebook можно увидеть, как гигантская черепаха хочет обниматься: https://www.facebook.com/AnimalLoversOnly1/videos/242545276572254/.
- 24 Нейроны сетчатки глаза разрастаются в определенном направлении до тех пор, пока не достигнут зрительной коры в тыльной части мозга, остановившись сначала в первой промежуточной станции, латеральном коленчатом теле. Кроме того, нейроны прекращают свой рост в области верхнего двухолмия (для управления движениями глаз), в предкрышечной области (для управления расширением и сужением зрачков), а также в области супрахиазматического

- ядра (для управления суточными ритмами и регулирования гормонов в зависимости от времени суток, на которое указывает количество солнечного света). Этот процесс отчасти осуществляется в соответствии с генетическими инструкциями.
- 25 M. Bedny, H. Richardson, and R. Saxe, "Visual' Cortex Responds to Spoken Language in Blind Children," Journal of Neuroscience 35, no. 33 (2015): 11674–11681; B. Röder et al., "Speech Processing Activates Visual Cortex in Congenitally Blind Humans," European Journal of Neuroscience 16, no. 5 (2002): 930–936.
- 26 M. Sur, P. E. Garraghty, and A. W. Roe, "Experimentally Induced Visual Projections into Auditory Thalamus and Cortex," Science 242, no. 4884 (1988): 1437–1441; S. L. Pallas, A. W. Roe, and M. Sur, "Visual Projections Induced into the Auditory Pathway of Ferrets. I. Novel Inputs to Primary Auditory Cortex (AI) from the LP/Pulvinar Complex and the Topography of the MGN-AI Projection," Journal of Comparative Neurology 298, no. 1 (1990): 50–68.
- 27 A. L. de Dieuleveult et al., "Effects of Aging in Multisensory Integration: A Systematic Review," Frontiers in Aging Neuroscience 9 (2017): 80, http://dx.doi.org/10.3389/fnagi.2017.00080.
- 28 A. Shimamura, Get SMART! Five Steps toward a Healthy Brain (Scotts Valley, CA: CreateSpace, 2017).
- 29 R. Peters, "Ageing and the Brain," Postgraduate Medical Journal 82, no. 964 (2006): 84–88; R. Rutledge et al., "Risk Taking for Potential Reward Decreases across the Lifespan," Current Biology 26, no. 12 (2016): 1634–1639.
- 30 M. Kubota et al., "Alcohol Consumption and Frontal Lobe Shrinkage: Study of 1432 Non-Alcoholic Subjects," Journal of Neurology, Neurosurgery and Psychiatry 71, no. 1 (2001): 104–106; X. Yang et al., "Cortical and Subcortical Gray Matter Shrinkage in Alcohol-Use Disorders: A Voxel-Based Meta-Analysis," Neuroscience and Biobehavioral Reviews 66 (2016): 92–103.
- 31 A. M. Hedman et al., "Human Brain Changes across the Life Span: A Review of 56 Longitudinal Magnetic Resonance Imaging Studies," Human Brain Mapping 33, no. 8 (2012): 1987–2002.
- 32 Peters, "Ageing and the Brain."
- 33 Shimamura, Get SMART!.
- 34 M. Balter, "The Incredible Shrinking Human Brain," Science, July 25, 2011, http://www.sciencemag.org/news/2011/07/incredible-shrinking-human-brain; C. C. Sherwood et al., "Aging of the Cerebral Cortex Differs between Humans and Chimpanzees," Proceedings of the National Academy of Sciences 108, no. 32 (2011): 13029–13034.
- 35 R. Buckner, J. Andrews-Hanna, D. Schacter, "The Brain's Default Network: Anatomy, Function, and Relevance to Disease," Annals of the New York Academy of Sciences 1124, no. 1 (2008): 1–38.
- 36 S. Gauthier et al., "Mild Cognitive Impairment," Lancet 367, no. 9518 (2006): 1262–1270.
- 37 Gauthier et al., "Mild Cognitive Impairment."
- 38 R. C. Petersen, "Mild Cognitive Impairment," Continuum: Lifelong Learning in Neurology 22, no. 2, Dementia (2016): 404.

- 39 B. C. M. Stephan et al., "The Neuropathological Profile of Mild Cognitive Impairment (MCI): A Systematic Review," Molecular Psychiatry 17, no. 11 (2012): 1056.
- 40 R. C. Petersen et al., "Mild Cognitive Impairment: A Concept in Evolution," Journal of Internal Medicine 275, no. 3 (2014): 214–228.
- 41 L. Qian et al., "Intrinsic Frequency Specific Brain Networks for Identification of MCI Individuals Using Resting-State fMRI," Neuroscience Letters 664 (2018): 7–14.
- 42 Y. Stern, "Cognitive Reserve in Ageing and Alzheimer's Disease," Lancet Neurology 11, no. 11 (2012): 1006–1012; Y. Stern, "Cognitive Reserve: Implications for Assessment and Intervention," Folia Phoniatrica et Logopaedica 65, no. 2 (2013): 49–54; H. Amieva et al., "Compensatory Mechanisms in Higher-Educated Subjects with Alzheimer's Disease: A Study of 20 Years of Cognitive Decline," Brain 137, no. 4 (2014): 1167–1175.
- 43 Shimamura, Get SMART!.
- 44 P. Belluck, "Will We Ever Cure AD?," The New York Times, November 19, 2018, p. D6.
- 45 P. Eikelenboom and R. Veerhuis, "The Importance of Inflammatory Mechanisms for the Development of Alzheimer's Disease," Experimental Gerontology 34, no. 3 (1999): 453–461.
- 46 P. L. McGeer, J. Rogers, and E. G. McGeer, "Inflammation, Anti-inflammatory Agents, and Alzheimer's Disease: The Last 22 Years," Journal of Alzheimer's Disease 54, no. 3 (2016): 853–857.
- 47 N. Brouwers, K. Sleegers, and C. Van Broeckhoven, "Molecular Genetics of Alzheimer's Disease: An Update," Annals of Medicine 40, no. 8 (2008): 562–583;
  A. Pink et al., "Neuropsychiatric Symptoms, APOE 4, and the Risk of Incident Dementia: A Population-Based Study," Neurology 84, no. 9 (2015): 935–943.
- 48 Y. Y. Lim, E. C. Mormino, and Alzheimer's Disease Neuroimaging Initiative, "APOE Genotype and Early β-Amyloid Accumulation in Older Adults without Dementia," Neurology 89, no. 10 (2017): 1028–1034.
- 49 "Dr John Zeisel: Looking at Dementia with Hope," posted by Jewish Home Life Communities, June 20, 2018, https://www.youtube.com/watch?v=Ze1WyCh 5zQ.
- 50 G. Livingston et al., "Dementia Prevention, Intervention, and Care," Lancet 390, no. 10113 (2017): 2673–2734.
- 51 Associated Press, "Low-Dose Aspirin Too Risky for Most People, Studies Find," NBC News, August 27, 2018, https://www.nbcnews.com/health/heart-health/low-dose-aspirin-too-risky-most-people-studies-find-n904281.
- 52 European Society of Cardiology, "Jury Still Out on Aspirin a Day to Prevent Heart Attack and Stroke," Science Daily, August 26, 2018, www.sciencedaily.com/releases/2018/08/180826120759.htm.
- 53 J. Rée, "The Brain's Way of Healing: Stories of Remarkable Recoveries and Discoveries by Norman Doidge—Review," The Guardian, January 23, 2015, https://www.theguardian.com/books/2015/jan/23/the-brains-way-healing-stories-remarkable-recoveries-norman-doidge-review; N. Doidge, The Brain's Way of Healing: Stories of Remarkable Recoveries and Discoveries (London: Penguin UK, 2015).

- 54 A. Zuger, "The Brain: Malleable, Capable, Vulnerable," The New York Times, May 29, 2007, https://www.nytimes.com/2007/05/29/health/29book.html.
- 55 S. M. Ryan and Y. M. Nolan, "Neuroinflammation Negatively Affects Adult Hippocampal Neurogenesis and Cognition: Can Exercise Compensate?," Neuroscience and Biobehavioral Reviews 61 (2016): 121–131.
- 56 O. Bergmann, K. L. Spalding, and J. Frisén, "Adult Neurogenesis in Humans," Cold Spring Harbor Perspectives in Biology 7, no. 7 (2015): a018994.
- 57 S. F. Sorrells et al., "Human Hippocampal Neurogenesis Drops Sharply in Children to Undetectable Levels in Adults," Nature 555, no. 7696 (2018): 377.
- 58 M. Boldrini et al., "Human Hippocampal Neurogenesis Persists throughout Aging," Cell Stem Cell 22, no. 4 (2018): 589–599.
- 59 S. C. Danzer, "Adult Neurogenesis in the Human Brain: Paradise Lost?," Epilepsy Currents 18, no. 5 (2018): 329–331; G. Kempermann et al., "Human Adult Neurogenesis: Evidence and Remaining Questions," Cell Stem Cell 23, no. 1 (2018): 25–30.
- 60 Из личного общения с Мари Кодама 25 декабря 2016 года.
- 61 R. W. Berkowsky, J. Sharit, and S. J. Czaja, "Factors Predicting Decisions about Technology Adoption among Older Adults," Innovation in Aging 1, no. 3 (2018): igy002; T. L. Mitzner et al., "Technology Adoption by Older Adults: Findings from the PRISM Trial," Gerontologist 59, no. 1 (2018): 34–44.
- 62 Vision Council Research, "U.S. Optical Overview and Outlook," December 2015, https://www.thevisioncouncil.org/sites/default/files/Q415-Topline-Overview-Presentation-Stats-with-Notes-FINAL.PDF.
- 63 W. Chien and F. R. Lin, "Prevalence of Hearing Aid Use among Older Adults in the United States," Archives of Internal Medicine 172, no. 3 (2012): 292–293.
- 64 L. Rapoport, "Hearing Aids Tied to Less Hospitalization for Older U.S. Adults," Reuters, May 9, 2018, https://www.reuters.com/article/us-health-hearing/hearing-aids-tied-to-less-hospitalization-for-older-u-s-adults-idUSKBN1IA2ZR.

- 1 I. Kohler, "Experiments with Goggles," Scientific American 206, no. 5 (1962): 62–73.
- 2 S. P. Johnson and E. E. Hannon, "Perceptual Development," Handbook of Child Psychology and Developmental Science 2 (2015): 63–112; L. G. Craton, "The Development of Perceptual Completion Abilities: Infants' Perception of Stationary, Partially Occluded Objects," Child Development 67, no. 3 (1996): 890–904; B. S. Hadad and R. Kimchi, "Perceptual Completion of Partly Occluded Contours during Childhood," Journal of Experimental Child Psychology 167 (2018): 49–61.
- 3 H. E. F. von Helmholtz, Treatise on Physiological Optics, ed. and trans. J. P. C. Southall (1909; repr., New York: Dover, 1962).
- 4 J. Luauté et al., "Dynamic Changes in Brain Activity during Prism Adaptation," Journal of Neuroscience 29, no. 1 (2009): 169–178; Y. Rossetti et al., "Testing Cognition and Rehabilitation in Unilateral Neglect with Wedge Prism Adaptation: Multiple Interplays between Sensorimotor Adaptation and Spatial Cognition,"

- in Clinical Systems Neuroscience, ed. K. Kansaku, L. G. Cohen, and N. Birbaumer, pp. 359–381 (Tokyo: Springer, 2015).
- 5 J. Luauté et al., "Functional Anatomy of the Therapeutic Effects of Prism Adaptation on Left Neglect," Neurology 66, no. 12 (2006): 1859–1867; M. Lunven et al., "Anatomical Predictors of Successful Prism Adaptation in Chronic Visual Neglect," Cortex (2018).
- 6 R. Held, "Plasticity in SensoryMotor Systems," Scientific American 213, no. 5 (1965): 84–97; J. Fernández-Ruiz and R. Díaz, "Prism Adaptation and Aftereffect: Specifying the Properties of a Procedural Memory System," Learning and Memory 6, no. 1 (1999): 47–53.
- 7 Эта система чувствительна к двум разным параметрам, таким как угловое смещение и количество случаев двигательной адаптации.
- 8 Видео этого эксперимента можно посмотреть здесь: "Erismann and Kohler inversion 'upside-down' goggles—Film 2," posted by Perceiving Acting, April 10, 2013, https://www.youtube.com/watch?v=z1HYcN7f9N4.
- 9 P. Sachse et al., "'The World Is Upside Down'—The Innsbruck Goggle Experiments of Theodor Erismann (1883–1961) and Ivo Kohler (1915–1985)," Cortex 92 (2017): 222–232.
- 10 Heart and Stroke Foundation of Canada, "One Quarter of Seniors over 70 Have Had Silent Strokes," ScienceDaily, October 5, 2011, www.sciencedaily.com/ releases/2011/10/111004113739.htm.
- 11 A. R. Riestra and A. M. Barrett, "Rehabilitation of Spatial Neglect," in Handbook of Clinical Neurology, vol. 110, ed. M. P. Barnes and D. C. Good, pp. 347–355 (Amsterdam: Elsevier, 2013).
- 12 Y. Rossetti et al., "Prism Adaptation to a Rightward Optical Deviation Rehabilitates Left Hemispatial Neglect," Nature 395, no. 6698 (1998): 166; F. Frassinetti et al., "Long-Lasting Amelioration of Visuospatial Neglect by Prism Adaptation," Brain 125, no. 3 (2002): 608–623; N. Vaes et al., "Rehabilitation of Visuospatial Neglect by Prism Adaptation: Effects of a Mild Treatment Regime. A Randomised Controlled Trial," Neuropsychological Rehabilitation 28, no. 6 (2018): 899–918.
- 13 M. Botvinick and J. Cohen, "Rubber Hands 'Feel' Touch That Eyes See," Nature 391 (1998): 756, http://dx.doi.org/10.1038/35784; A. Kalckert and H. H. Ehrsson, "The Onset Time of the Ownership Sensation in the Moving Rubber Hand Illusion," Frontiers in Psychology 8 (2017): 344; M. Tsakiris, "My Body in the Brain: A Neurocognitive Model of Body-Ownership," Neuropsychologia 48 (2010): 703–712, http://dx.doi.org/10.1016/j.neuropsychologia.2009.09.034; M. Tsakiris and P. Haggard, "The Rubber Hand Illusion Revisited: Visuotactile Integration and Self-Attribution," Journal of Experimental Psychology: Human Perception and Performance 31 (2005): 80–91, http://dx.doi.org/10.1037/0096-1523.31.1.80; видео можно посмотреть здесь: "The Rubber Hand Illusion—Horizon: Is Seeing Believing?—BBC Two," posted by BBC, October 15, 2010, https://www.youtube.com/watch?v=sxwn1w7MJvk, and "Is That My Real Hand? Breakthrough," posted by National Geographic, November 4, 2015, https://www.youtube.com/watch?v=DphlhmtGRqI.

- 14 M. Tsakiris, "Looking for Myself: Current Multisensory Input Alters Self-Face Recognition," PLoS One 3 (2008): e4040, http://dx.doi.org/10.1371/journal. pone.0004040; M. Tsakiris, "The Multisensory Basis of the Self: From Body to Identity to Others," Quarterly Journal of Experimental Psychology 70, no. 4 (2017): 597–609; M. P. Paladino et al., "Synchronous Multisensory Stimulation Blurs Self-Other Boundaries," Psychological Science 21 (2010): 1202–1207, http://dx.doi.org/10.1177/0956797610379234; видео можно посмотреть здесь: "Demo Enfacement Illusion Tsakiris October 2011," "manostsak," February 13, 2018, https://www.youtube.com/watch?v=WO1MrUX0K3c.
- 15 G. Porciello et al., "The 'Enfacement' Illusion: A Window on the Plasticity of the Self," Cortex 104 (2018): 261–275.
- 16 National Transportation Safety Board, NTSB ID: NYC99MA178. Катастрофа произошла 16 июля 1999 года в Вайнярд Хейвене, штат Массачусетс (Washington, DC: NTSB, 1999). В официальном отчете Национального совета по безопасности на транспорте о ее причинах было сказано: «Иллюзии или ложные представления имеют место в случаях, когда информация, предоставляемая органами чувств, неправильно интерпретируется или является недостаточной... Некоторые иллюзии могут повлечь за собой пространственную дезориентацию и неспособность точно определить высоту или направление движения самолета по отношению к поверхности земли». Более подробную информацию можно найти здесь: R. Gibb, B. Ercoline, and L. Scharff, "Spatial Disorientation: Decades of Pilot Fatalities," Aviation, Space, and Environmental Medicine 82, no. 7 (2011): 717–724.
- 17 W. Magerl and R. D. Treede, "Secondary Tactile Hypoesthesia: A Novel Type of Pain-Induced Somatosensory Plasticity in Human Subjects," Neuroscience Letters 361, nos. 1–3 (2004): 136–139; T. Weiss, "Plasticity and Cortical Reorganization Associated with Pain," Zeitschrift für Psychologie (2016).
- 18 S. Aglioti, A. Bonazzi, and F. Cortese, "Phantom Lower Limb as a Perceptual Marker of Neural Plasticity in the Mature Human Brain," Proceedings of the Royal Society of London. Series B: Biological Sciences 255, no. 1344 (1994): 273–278; L. Nikolajsen and K. F. Christensen, "Phantom Limb Pain," in Nerves and Nerve Injuries, ed. R. Tubbs et al., pp. 23–34 (New York: Elsevier, 2015).
- 19 E. L. Altschuler et al., "Rehabilitation of Hemiparesis after Stroke with a Mirror," Lancet 353, no. 9169 (1999): 2035–2036; V. S. Ramachandran and D. Rogers-Ramachandran, "Phantom Limbs and Neural Plasticity," Archives of Neurology 57, no. 3 (2000): 317–320; J. Barbin et al., "The Effects of Mirror Therapy on Pain and Motor Control of Phantom Limb in Amputees: A Systematic Review," Annals of Physical and Rehabilitation Medicine 59, no. 4 (2016): 270–275.
- 20 R. S. Davidson et al., "Surgical Correction of Presbyopia," Journal of Cataract & Refractive Surgery 42, no. 6 (2016): 920–930.
- 21 D. E. Levari et al., "Prevalence-Induced Concept Change in Human Judgment," Science 360, no. 6396 (2018): 1465–1467.
- 22 Levari et al., "Prevalence-Induced Concept Change."
- 23 National Eye Institute, "Facts about Cataracts," September 2015, https://nei.nih.gov/health/cataract/cataract facts.

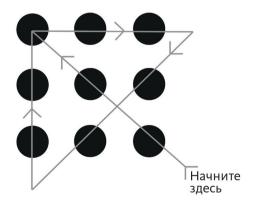
- 24 National Eye Institute, "Facts about Cataracts."
- 25 J. O. Pickles, "Mutation in Mitochondrial DNA as a Cause of Presbycusis," Audiology and Neurotology 9, no. 1 (2004): 23–33; Y. Shen et al., "Cognitive Decline, Dementia, Alzheimer's Disease and Presbycusis: Examination of the Possible Molecular Mechanism," Frontiers in Neuroscience 12 (2018): 394.
- 26 V. Lobo et al., "Free Radicals, Antioxidants and Functional Foods: Impact on Human Health," Pharmacognosy Reviews 4, no. 8 (2010): 118; A. Santo, H. Zhu, and Y. R. Li, "Free Radicals: From Health to Disease," Reactive Oxygen Species 2, no. 4 (2016): 245–263.
- 27 Lobo et al., "Free Radicals"; M. Serafini and I. Peluso, "Functional Foods for Health: The Interrelated Antioxidant and AntiInflammatory Role of Fruits, Vegetables, Herbs, Spices and Cocoa in Humans," Current Pharmaceutical Design 22, no. 44 (2016): 6701–6715.
- 28 E. A. Decker et al., "Hurdles in Predicting Antioxidant Efficacy in Oil-in-Water Emulsions," Trends in Food Science and Technology 67 (2017): 183–194.
- 29 The Mayo Clinic, "Antioxidants," February 7, 2017, https://www.mayoclinic.org/healthy-lifestyle/nutrition-and-healthy-eating/multimedia/antioxidants/sls-20076428.
- 30 National Institute on Deafness and Other Communication Disorders, "Age-Related Hearing Loss," March 2016, https://www.nidcd.nih.gov/health/age-related-hearing-loss.
- 31 T. G. Sanchez et al., "Musical Hallucination Associated with Hearing Loss," Arquivos de Neuro-psiquiatria 69, no. 2B (2011): 395–400; M. M. J. Linszen et al., "Auditory Hallucinations in Adults with Hearing Impairment: A Large Prevalence Study," Psychological Medicine 49, no. 1 (2019): 132–139.
- 32 The Mayo Clinic, "Tinnitus," https://www.mayoclinic.org/diseases-conditions/tinnitus/symptoms-causes/syc-20350156.
- 33 J. Henry, K. Dennis, and M. Schechter, "Theoretical/Review Article—General Review of Tinnitus: Prevalence, Mechanisms, Effects, and Management," Journal of Speech, Language, and Hearing Research 48, no. 5 (2005): 1204–1234; A. McCormack et al., "A Systematic Review of the Reporting of Tinnitus Prevalence and Severity," Hearing Research 337 (2016): 70–79.
- 34 Henry et al., "Theoretical/Review Article—General Review of Tinnitus," p. 1207.
- 35 A. L. Giraud et al., "A Selective Imaging of Tinnitus," Neuroreport 10, no. 1 (1999): 1–5; N. Weisz et al., "Tinnitus Perception and Distress Is Related to Abnormal Spontaneous Brain Activity as Measured by Magnetoencephalography," PLoS Medicine 2, no. 6 (2005): e153; A. B. Elgoyhen et al., "Tinnitus: Perspectives from Human Neuroimaging," Nature Reviews Neuroscience 16, no. 10 (2015): 632.
- 36 M. Dominguez et al., "A Spiking Neuron Model of Cortical Correlates of Sensorineural Hearing Loss: Spontaneous Firing, Synchrony, and Tinnitus," Neural Computation 18, no. 12 (2006): 2942–2958; R. Schaette and R. Kempter, "Development of Tinnitus-Related Neuronal Hyperactivity through Homeostatic Plasticity after Hearing Loss: A Computational Model," European Journal of Neuroscience 23 (2006): 3124–3138; S. E. Shore, L. E. Roberts, and B. Langguth,

- "Maladaptive Plasticity in Tinnitus—Triggers, Mechanisms and Treatment," Nature Reviews Neurology 12, no. 3 (2016): 150.
- 37 R. Schaette et al., "Acoustic Stimulation Treatments against Tinnitus Could Be Most Effective When Tinnitus Pitch Is within the Stimulated Frequency Range," Hearing Research 269, nos. 1–2 (2010): 95–101; R. Schaette, "Mechanisms of Tinnitus," in Annual Tinnitus Research Review, ed. D. Baguley and N. Wray, pp. 10–15 (Sheffield, UK: British Tinnitus Association, 2016).
- 38 A. Gawande, Being Mortal: Medicine and What Matters in the End (New York: Metropolitan Books, 2014), p. 31.
- 39 R. L. Doty and V. Kamath, "The Influences of Age on Olfaction: A Review," Frontiers in Psychology 5 (2014): 20; J. Seubert et al., "Prevalence and Correlates of Olfactory Dysfunction in Old Age: A Population-Based Study," Journals of Gerontology Series A: Biomedical Sciences and Medical Sciences 72, no. 8 (2017): 1072–1079.
- 40 C. Bushdid et al., "Humans Can Discriminate More Than 1 Trillion Olfactory Stimuli," Science 343, no. 6177 (2014): 1370–1372; S. C. P. Williams, "Human Nose Can Detect a Trillion Smells," Science, March 20, 2014, https://www.sciencemag.org/news/2014/03/human-nose-can-detect-trillion-smells.
- 41 S. S. Schiffman, "Taste and Smell Losses in Normal Aging and Disease," Journal of the American Medical Association 278, no. 16 (1997): 1357–1362; E. McGinley, "Supporting Older Patients with Nutrition and Hydration," Journal of Community Nursing 31, no. 4 (2017).
- 42 Y. Zhang et al., "Coding of Sweet, Bitter, and Umami Tastes: Different Receptor Cells Sharing Similar Signaling Pathways," Cell 112, no. 3 (2003): 293–301; K. Kurihara, "Umami the Fifth Basic Taste: History of Studies on Receptor Mechanisms and Role as a Food Flavor," BioMed Research International (2015): article ID 189402.
- 43 J. L. Garrison and Z. A. Knight, "Linking Smell to Metabolism and Aging," Science 358, no. 6364 (2017): 718–719; S. Nordin, "Sensory Perception of Food and Aging," in Food for the Aging Population, ed. M. Raats, L. De Groot, and D. van Asselt, pp. 57–82 (New York: Elsevier, 2017); G. Sergi et al., "Taste Loss in the Elderly: Possible Implications for Dietary Habits," Critical Reviews in Food Science and Nutrition 57, no. 17 (2017): 3684–3689; S. Schiffman and M. Pasternak, "Decreased Discrimination of Food Odors in the Elderly," Journal of Gerontology 34 (1979): 73–79, http://dx.doi.org/10.1093/geronj/34.1.73; S. S. Schiffman, "Taste and Smell Losses with Age," Boletín de la Asociación Médica de Puerto Rico 83 (1991): 411–414; S. S. Schiffman, J. Moss, and R. P. Erickson, "Thresholds of Food Odors in the Elderly," Experimental Aging Research (1976): 389–398, http://dx.doi.org/10.1080/03610737608257997; S. S. Schiffman and J. Zervakis, "Taste and Smell Perception in the Elderly: Effect of Medication and Disease," Advances in Food and Nutrition Research 44 (2002): 247–346, http://dx.doi.org/10.1016/S1043-4526(02)44006-5.
- 44 J. M. Boyce and G. R. Shone, "Effects of Ageing on Smell and Taste," Postgraduate Medical Journal 82, no. 966 (2006): 239–241; L. E. Spotten et al., "Subjective and Objective Taste and Smell Changes in Cancer," Annals of Oncology 28, no. 5

- (2017): 969–984; B. N. Landis, C. G. Konnerth, and T. Hummel, "A Study on the Frequency of Olfactory Dysfunction," Laryngoscope 114, no. 10 (2004): 1764–1769.
- 45 S. Schiffman, "Changes in Taste and Smell with Age: Psychophysical Aspects," in Sensory Systems and Communication in the Elderly: Aging, vol. 10, ed. J. M. Ordy and K. Brizzee, pp. 227–246 (New York: Raven Press, 1979).
- 46 Из личного общения со Скоттом Грэфтоном 29 марта 2018 года.

- 1 Эти слова Арта Блейки представлены на обложке альбома: Art Blakey Quintet, A Night at Birdland, vol. 3, Blue Note Records, compact disc/10-inch LP, 1954.
- 2 L. B. Karasik et al., "WEIRD Walking: CrossCultural Research on Motor Development," Behavioral and Brain Sciences 33, nos. 2–3 (2010): 95–96. Акроним WEIRD (от western, educated, industrialized, rich, democratic) расшифровывается как «западные, образованные, промышленно развитые, богатые, демократические страны», поскольку именно на эту подгруппу приходится 80 процентов всего, что известно бихевиористам о поведении человека, хотя численность этой подгруппы составляет всего 12 процентов от общей численности населения Земли.
- 3 R. D. Baker and F. R. Greer, "Diagnosis and Prevention of Iron Deficiency and Iron-Deficiency Anemia in Infants and Young Children (0–3 Years of Age)," Pediatrics 126, no. 5 (2010): 1040–1050; P. M. Gupta et al., "Iron, Anemia, and Iron Deficiency Anemia among Young Children in the United States," Nutrients 8, no. 6 (2016): 330, http://dx.doi.org/10.3390/nu8060330.
- 4 Committee on How People Learn II, How People Learn II: Learners, Contexts and Cultures (Washington, DC: National Academies Press, 2018), p. 21, доступно для бесплатной загрузки здесь: http://nap.edu/24783.
- 5 Из личного общения с Дэвидом Кракауэром 19 июля 2019 года.
- 6 Committee on How People Learn II, How People Learn II.
- 7 Роберт Стернберг писал о важности овладения знаниями в книге о тройственной теории интеллекта, хоть и не выделял его как отдельный тип интеллекта, как делаю я в этой книге. R. J. Sternberg, Beyond IQ: A Triarchic Theory of Intelligence (Cambridge: Cambridge University Press, 1985).
- 8 Я писал об информационной перегрузке в одной из своих предыдущих книг: D. J. Levitin, The Organized Mind: Thinking Straight in the Age of Information Overload (New York: Dutton, 2014). (Левитин Д. Организованный ум. Как мыслить и принимать решения в эпоху информационной перегрузки. М.: Манн, Иванов и Фербер, 2019.)
- 9 E. L. Thorndike, "The Measurement of Intelligence: Present Status," Psychological Review 31 (1924): 219–252.
- 10 H. Gardner, "Reflections on Multiple Intelligences: Myths and Messages," Phi Delta Kappan 77 (1995): 200–209.
- 11 R. J. Sternberg et al., "The Relationship between Academic and Practical Intelligence: A Case Study in Kenya," Intelligence 29, no. 5 (2001): 408.

- 12 Типичный вопрос выглядел так: «Маленький ребенок в вашей семье заболел хома. У него ангина, головная боль и жар. Он болеет три дня. Какие из следующих пяти лекарственных трав Луо (yadh nyaluo) могут вылечить его?
- 1) Чамама. Возьмите лист и стебель (вдохните лечебное снадобье в нос, чтобы вычихать болезнь).
- 2) Каладали. Возьмите листья и стебли, выпейте.
- 3) Обуо. Возьмите листья и стебли.
- 4) Огака. Возьмите корни, измельчите и выпейте.
- 5) Абундо. Возьмите листья и стебли.
- В этом вопросе варианты 1 и 2 распространенное лекарство от хомы, вариант 3 редкое лекарство, вариант 4 лекарство, которое не используется для лечения хомы, а вариант 5 вымышленное (несуществующее) лекарственное растение. Таким образом, варианты 1–3 расценивались как правильные ответы. В случае выбора варианта 5 начислялось три штрафных балла. Для того чтобы избежать этноцентрического смещения результатов, подсчет очков был основан на знаниях целителя, а не на том, что жители Запада могут считать правильными ответами.
- 13 Sternberg et al., "The Relationship between Academic and Practical Intelligence," p. 414.
- 14 M. Gazzaniga et al., Psychological Science, 3rd Canadian ed. (New York: W. W. Norton, 2010).
- 15 J. L. Adams, Conceptual Blockbusting: A Guide to Better Ideas (New York: W. W. Norton, 1980). (Адамс Дж. Разблокируй свой разум. Техника поиска оригинальных решений сложных проблем и генерации гениальных идей. М.: Эксмо, 2008.)
- 16 Для тех, кто больше увлекается математикой, мой профессор Дьёрдь Пойа написал «Как решить задачу» замечательную маленькую книгу, которая помогла целым поколениям студентов развивать навыки решения задач, а поскольку она написана в легком и увлекательном стиле, ее читают даже те, кто боится математики. G. Polya, How to Solve It: A New Aspect of Mathematical Method (Princeton, NJ: Princeton University Press, 2004). (Пойа Д. Как решить задачу. М.: Либроком, 2010.)



- 17 Из личного общения с Джеффри Могилом 15 июля 2019 года.
- 18 M. Lankford, Becoming Leonardo: An Exploded View of the Life of Leonardo da Vinci (Brooklyn, NY: Melville House, 2017).
- 19 A. P. Shimamura et al., "Memory and Cognitive Abilities in Academic Professors: Evidence for Successful Aging," Psychological Science 6 (1995): 271–277; A. P. Shimamura, Get SMART! Five Steps toward a Healthy Brain (Scotts Valley, CA: CreateSpace, 2017).
- 20 R. C. Gur et al., "Age and Regional Cerebral Blood Flow at Rest and during Cognitive Activity," Archives of General Psychiatry 44 (1987): 617–621.
- 21 R. L. Buckner, "Memory and Executive Function in Aging and AD: Multiple Factors That Cause Decline and Reserve Factors That Compensate," Neuron 44 (2004): 195–208.
- 22 S. Aichele et al., "Fluid Intelligence Predicts Change in Depressive Symptoms in Later Life: The Lothian Birth Cohort 1936," Psychological Science (2018): 1–12, http://dx.doi.org/10.1177/0956797618804501.
- 23 Sternberg et al., "The Relationship between Academic and Practical Intelligence."
- 24 S. L. Brincat et al., "Gradual Progression from Sensory to Task-Related Processing in Cerebral Cortex," Proceedings of the National Academy of Sciences 115, no. 30 (2018): E7202—E7211.
- 25 Brincat et al., "Gradual Progression from Sensory to Task-Related Processing in Cerebral Cortex," Proceedings of the National Academy of Sciences 115, no. 30 (2018): E7202–E7211.
- 26 A. Susac et al., "Development of Abstract Mathematical Reasoning: The Case of Algebra," Frontiers in Human Neuroscience 8 (2014): 679.
- 27 Susac et al., "Development of Abstract Mathematical Reasoning."
- 28 S. R. Howard et al., "Numerical Ordering of Zero in Honey Bees," Science 360, no. 6393 (2018): 1124–1126; A. Nieder, "Honey Bees Zero In on the Empty Set," Science 360, no. 6393 (2018): 1069–1070.
- 29 D. Ackerman, One Hundred Names for Love (New York: W. W. Norton, 2011), pp. 82–83. (Акерман Д. 100 имен любви. М.: ЛитРес, 2015.)
- 30 S. Kühn et al., "The Importance of the Default Mode Network in Creativity a Structural MRI Study," Journal of Creative Behavior 48, no. 2 (2014): 152–163; R. E. Beaty et al., "Creativity and the Default Network: A Functional Connectivity Analysis of the Creative Brain at Rest," Neuropsychologia 64 (2014): 92–98.
- 31 T. A. Salthouse, "The Processing-Speed Theory of Adult Age Differences in Cognition," Psychological Review 103, no. 3 (1996): 403; T. A. Salthouse, T. M. Atkinson, and D. E. Berish, "Executive Functioning as a Potential Mediator of Age-Related Cognitive Decline in Normal Adults," Journal of Experimental Psychology: General 132, no. 4 (2003): 566; L. J. Whalley et al., "Cognitive Reserve and the Neurobiology of Cognitive Aging," Ageing Research Reviews 3, no. 4 (2004): 369–382.
- 32 Whalley et al., "Cognitive Reserve."
- 33 P. G. Ince, "Pathological Correlates of Late-Onset Dementia in a Multicenter Community-Based Population in England and Wales," Lancet 357, no. 9251 (2001): 169–175.

- 34 Whalley et al., "Cognitive Reserve."
- 35 Whalley et al., "Cognitive Reserve"; K. Fujishiro et al., "The Role of Occupation in Explaining Cognitive Functioning in Later Life: Education and Occupational Complexity in a US National Sample of Black and White Men and Women," Journals of Gerontology: Series B (2017): gbx112, https://doi.org/10.1093/geronb/gbx112.
- 36 S. Cullum et al., "Decline across Different Domains of Cognitive Function in Normal Ageing: Results of a Longitudinal Population-Based Study Using CAMCOG," International Journal of Geriatric Psychiatry 15 (2000): 853–862; M. Zhang et al., "The Prevalence of Dementia and Alzheimer's Disease in Shanghai, China: Impact of Age, Gender, and Education," Annals of Neurology: Official Journal of the American Neurological Association and the Child Neurology Society 27, no. 4 (1990): 428–437; Y. Stern, "Cognitive Reserve in Ageing and Alzheimer's Disease," Lancet Neurology 11, no. 11 (2012): 1006–1012; E. A. Boots et al., "Occupational Complexity and Cognitive Reserve in a Middle-Aged Cohort at Risk for Alzheimer's Disease," Archives of Clinical Neuropsychology 30, no. 7 (2015): 634–642.
- 37 K. Duncker and L. S. Lees, "On Problem-Solving," Psychological Monographs 58, no. 5 (1945): 1.
- 38 Существует несколько вариантов и формулировок этой задачи, от первоначальной концепции Дункера до работ Гика и Холиока, а также статей в учебниках по когнитивной психологии. Такая формулировка представляет собой результат выполненного мной объединения всех вариантов. Duncker and Lees, "On Problem-Solving"; M. L. Gick and K. J. Holyoak, "Schema Induction and Analogical Transfer," Cognitive Psychology 15, no. 1 (1983): 1–38; M. L. Gick and K. J. Holyoak, "Analogical Problem Solving," Cognitive Psychology 12, no. 3 (1980): 306–355.
- 39 E. E. Lee and D. V. Jeste, "Neurobiology of Wisdom," in The Cambridge Handbook of Wisdom, ed. R. J. Sternberg and J. Glück (Cambridge, UK: Cambridge University Press, 2019).
- 40 P. B. Baltes and J. Smith, "The Fascination of Wisdom: Its Nature, Ontogeny, and Function," Perspectives on Psychological Science 3, no. 1 (2008): 56–64.
- 41 J. Glück, S. Bluck, and N. M. Weststrate, "More on the MORE Life Experience Model: What We Have Learned (So Far)," Journal of Value Inquiry (2018): 1–22.
- 42 Согласно библейской притче, две женщины явились к царю Соломону, который был судьей в царстве, и каждая заявила о том, что она мать маленького ребенка. Соломон предложил разрубить ребенка пополам, чтобы поделить его между женщинами. Одна из них согласилась с таким решением, а другая умоляла его не делать этого и отдать ребенка сопернице. Соломон знал, что его совет раскроет любовь настоящей матери и что только истинная мать станет возражать против гибели ребенка.
- 43 S. Brassen et al., "Don't Look Back in Anger! Responsiveness to Missed Chances in Successful and Nonsuccessful Aging," Science 336, no. 6081 (2012): 612–614.
- 44 I. Grossmann et al., "Reasoning about Social Conflicts Improves into Old Age," Proceedings of the National Academy of Sciences 107, no. 16 (2010): 7246–7250;

## ПРИМЕЧАНИЯ

- D. A. Worthy et al., "With Age Comes Wisdom," Psychological Science 22, no. 11 (2011): 1375–1380.
- 45 J. N. Beadle et al., "Aging, Empathy, and Prosociality," Journals of Gerontology, Series B: Psychological Sciences and Social Sciences 70, no. 2 (2015): 215–224.
- 46 L. L. Carstensen et al., "Emotional Experience Improves with Age: Evidence Based on over 10 Years of Experience Sampling," Psychology and Aging 26, no. 1 (2011): 21–33.
- 47 Brassen et al., "Don't Look Back in Anger!"
- 48 L. L. Carstensen and M. DeLiema, "The Positivity Effect: A Negativity Bias in Youth Fades with Age," Current Opinion in Behavioral Sciences 19 (2018): 7–12.
- 49 K. S. Birditt, L. M. Jackey, and T. C. Antonucci, "Longitudinal Patterns of Negative Relationship Quality across Adulthood," Journals of Gerontology, Series B: Psychological Sciences and Social Sciences 64, no. 1 (2009): 55–64.
- 50 T. W. Meeks and D. V. Jeste, "Neurobiology of Wisdom," Archives of General Psychiatry 66, no. 4 (2009): 355–365.
- 51 P. S. Goldman-Rakic and R. M. Brown, "Regional Changes of Monoamines in Cerebral Cortex and Subcortical Structures of Aging Rhesus Monkeys," Neuroscience 6, no. 2 (1981): 177–187; L. Bäckman et al., "The Correlative Triad among Aging, Dopamine, and Cognition: Current Status and Future Prospects," Neuroscience and Biobehavioral Reviews 30, no. 6 (2006): 791–807; V. Kaasinen et al., "Age-Related Dopamine D2/D3 Receptor Loss in Extrastriatal Regions of the Human Brain," Neurobiology of Aging 21, no. 5 (2000): 683–688.
- 52 R. J. Sternberg, "Why Schools Should Teach for Wisdom: The Balance Theory of Wisdom in Educational Settings," Educational Psychologist 36, no. 4 (2001): 227–245.

- 1 S. Wonder, Visions, from Inner Visions, Tamla, T326L.
- 2 Я уже писал об этом в статье: D. J. Levitin, "Inside the Theater of the Mind. Review of How Emotions Are Made by Lisa Feldman Barrett," The Wall Street Journal, March 4, 2017, p. B5.
- 3 R. J. Davidson, "On Emotion, Mood, and Related Affective Constructs," in The Nature of Emotion: Fundamental Questions, ed. P. Ekman and R. J. Davidson, pp. 51–55 (New York: Oxford University Press, 1994).
- 4 J. LeDoux, "Rethinking the Emotional Brain," Neuron 73 (2002): 653–676.
- 5 F. de Waal, Mama's Last Hug (New York: W. W. Norton, 2019).
- 6 R. M. Macnab and D. E. Koshland, "The Gradient-Sensing Mechanism in Bacterial Chemotaxis," Proceedings of the National Academy of Sciences 69, no. 9 (1972): 2509–2512.
- 7 S. W. Emmons, "The Mood of a Worm," Science 338, no. 6106 (2012): 475–476; J. L. Garrison et al., "Oxytocin/Vasopressin-Related Peptides Have an Ancient Role in Reproductive Behavior," Science 338, no. 6106 (2012): 540–543.
- 8 LeDoux, "Rethinking the Emotional Brain."
- 9 LeDoux, "Rethinking the Emotional Brain."

- 10 D. G. Dutton and A. P. Aron, "Some Evidence for Heightened Sexual Attraction under Conditions of High Anxiety," Journal of Personality and Social Psychology 30, no. 4 (1974): 510.
- 11 S. Schachter and J. Singer, "Cognitive, Social, and Physiological Determinants of Emotional State," Psychological Review 69, no. 5 (1962): 379; G. L. White, S. Fishbein, and J. Rutsein, "Passionate Love and the Misattribution of Arousal," Journal of Personality and Social Psychology 41, no. 1 (1981): 56.
- 12 Я уже писал об этом в статье: D. J. Levitin, "Brain Candy. Review of Human: The Science behind What Makes Us Unique, by M. Gazzaniga," The New York Times Sunday Book Review, August 24, 2008, 5.
- 13 K. Jensen, J. Call, and M. Tomasello, "Chimpanzees Are Vengeful but Not Spiteful," Proceedings of the National Academy of Sciences 104, no. 32 (2007): 13046–13050.
- 14 T. Lomas, "Towards a Positive Cross-Cultural Lexicography: Enriching Our Emotional Landscape through 216 'Untranslatable' Words Pertaining to Well-Being," Journal of Positive Psychology 11, no. 5 (2016): 546–558, http://dx.doi. org/10.1080/17439760.2015.1127993; T. Lomas, "The Magic of Untranslatable Words," Scientific American, July 12, 2016, https://www.scientificamerican.com/article/the-magic-of-untranslatable-words/? print= true.
- 15 L. F. Barrett, How Emotions Are Made: The Secret Life of the Brain (Boston: Houghton Mifflin Harcourt, 2017). (Фельдман Барретт Л. Как рождаются эмоции. Революция в понимании мозга и управлении эмоциями. М.: Манн, Иванов и Фербер, 2017).
- 16 E. C. Nook et al., "The Nonlinear Development of Emotion Differentiation: Granular Emotional Experience Is Low in Adolescence," Psychological Science 29, no. 8 (2018): 1346–1357.
- 17 Я уже писал об этом в статье: D. J. Levitin, "The Ultimate Brain Quest. Review of Connectome: How the Brain's Wiring Makes Us Who We Are by Sebastian Seung," The Wall Street Journal, February 4, 2012, C5–C6.
- 18 S. J. Lupien et al., "Beyond the Stress Concept: Allostatic Load—A Developmental Biological and Cognitive Perspective," in Developmental Psychopathology, vol. 2, Developmental Neuroscience, ed. D. Cicchetti and D. J. Cohen, pp. 578–628 (Hoboken, NJ: John Wiley and Sons, 2015).
- 19 Онлайн-издание Оксфордского словаря, рубрика «stress», по состоянию на 25 февраля 2019 года: www.oed.com/view/Entry/191511.
- 20 P. Sterling, "Allostasis: A Model of Predictive Regulation," Physiology and Behavior 106 (2012): 5–15; G. H. Ice and G. D. James, Measuring Stress in Humans: A Practical Guide for the Field (Cambridge: Cambridge University Press, 2007), p. 284.
- 21 P. Sterling and J. Eyer, "Allostasis: A New Paradigm to Explain Arousal Pathology," in Handbook of Life Stress, Cognition and Health, ed. S. Fisher and J. Reason, pp. 629–649 (Oxford, UK: John Wiley and Sons, 1988).
- 22 Благодарю Соню Люпьен за помощь в написании предыдущих двух абзацев.
- 23 A. Edes and D. E. Crews, "Allostatic Load and Biological Anthropology," American Journal of Physical Anthropology 162 (2017): 44–70.

- 24 H. Frumkin et al., "Nature Contact and Human Health: A Research Agenda," Environmental Health Perspectives 125, no. 7 (2017): 075001; C. E. Hostinar and M. R. Gunnar, "Social Support Can Buffer against Stress and Shape Brain Activity," AJOB Neuroscience 6, no. 3 (2015): 34–42; A. Linnemann et al., "Music Listening as a Means of Stress Reduction in Daily Life," Psychoneuroendocrinology 60 (2015): 82–90.
- 25 A. Danese and B. S. McEwen, "Adverse Childhood Experiences, Allostasis, Allostatic Load, and Age-Related Disease," Physiology and Behavior 106, no. 1 (2012): 29–39; B. S. McEwen, "Allostasis and Allostatic Load: Implications for Neuropsychopharmacology," Neuropsychopharmacology 22, no. 2 (2000): 108–124.
- 26 D. J. Barker, "Developmental Origins of Chronic Disease," Public Health 126, no. 3 (2012): 185–189.
- 27 T. Booth et al., "Association of Allostatic Load with Brain Structure and Cognitive Ability in Later Life," Neurobiology of Aging 36 (2015): 1390–1399.
- 28 G. Bizik et al., "Allostatic Load as a Tool for Monitoring Physiological Dysregulations and Comorbidities in Patients with Severe Mental Illnesses," Harvard Review of Psychiatry 21 (2012): 296–313; R. W. Kobrosly et al., "Depressive Symptoms Are Associated with Allostatic Load among Community-Dwelling Older Adults," Physiology and Behavior 123 (2014): 223–230; J. A. Stewart, "The Detrimental Effects of Allostasis: Allostatic Load as a Measure of Cumulative Stress," Journal of Physiological Anthropology 25 (2006): 133–145.
- 29 E. Zsoldos et al., "Allostatic Load as a Predictor of Grey Matter Volume and White Matter Integrity in Old Age: The Whitehall II MRI Study," Scientific Reports 8, no. 1 (2018): 6411.
- 30 R. P. Juster and B. S. McEwen, "Sleep and Chronic Stress: New Directions for Allostatic Load Research," Sleep Medicine 16, no. 1 (2015): 7–8.
- 31 B. L. Ganzel, P. A. Morris, and E. Wethington, "Allostasis and the Human Brain: Integrating Models of Stress from the Social and Life Sciences," Psychological Review 117, no. 1 (2010): 134; B. S. McEwen and P. J. Gianaros, "Stress-and Allostasis-Induced Brain Plasticity," Annual Review of Medicine 62 (2011): 431–445; G. Tabibnia and D. Radecki, "Resilience Training That Can Change the Brain," Consulting Psychology Journal: Practice and Research 70, no. 1 (2018): 59–88.
- 32 G. Y. Lim et al., "Prevalence of Depression in the Community from 30 Countries between 1994 and 2014," Scientific Reports 8, no. 1 (2018): 2861; J. Wang et al., "Prevalence of Depression and Depressive Symptoms among Outpatients: A Systematic Review and Meta-analysis," BMJ Open 7, no. 8 (2017): e017173, http://dx.doi.org/10.1136/BMJopen-2017-017173; D. J. Brody, L. A. Pratt, and J. P. Hughes, "Prevalence of Depression among Adults Aged 20 and Over: United States, 2013–2016" (Hyattsville, MD: NCHS Data Brief 303, National Center for Health Statistics, 2018), pp. 1–8.
- 33 Institute for Quality and Efficiency in Health Care, "Depression: How Effective Are Antidepressants?," Informed Health Online, updated January 12, 2017, https://www.ncbi.nlm.nih.gov/books/NBK361016/; A. Cipriani et al., "Antidepressants

- Might Work for People with Major Depression: Where Do We Go from Here?," Lancet Psychiatry 5, no. 6 (2018): 461–463.
- 34 Из личного общения с Его Святейшеством Далай-ламой, Дхарамсала (Индия), 30 августа 2018 года.
- 35 "Dalai Lama: 'Anger, hatred, fear, is very bad for our health,' " posted by CBS News, October 2013, https://www.dailymotion.com/video/x16a709.
- 36 "No Regrets: Dalai Lama's Advice for Living and Dying," posted by Karuna Hospice Service, August 6, 2015, https://www.youtube.com/watch?v=k3eJ4ezYXDI.
- 37 Centers for Disease Control and Prevention, "Depression Is Not a Normal Part of Growing Older," https://www.cdc.gov/aging/mentalhealth/depression.htm.
- 38 U. Padayachey, S. Ramlall, and J. Chipps, "Depression in Older Adults: Prevalence and Risk Factors in a Primary Health Care Sample," South African Family Practice 59, no. 2 (2017): 61–66.
- 39 A. Fiske, J. L. Wetherell, and M. Gatz, "Depression in Older Adults," Annual Review of Clinical Psychology 5 (2009): 363–389.
- 40 K. L. Lichstein et al., "Insomnia in the Elderly," Sleep Medicine Clinics 1, no. 2 (2006): 221–229.
- 41 H. C. Hendrie et al., "The NIH Cognitive and Emotional Health Project: Report of the Critical Evaluation Study Committee," Alzheimer's and Dementia 2, no. 1 (2006): 12–32.
- 42 R. J. Davidson et al., "Neural and Behavioral Substrates of Mood and Mood Regulation," Biological Psychiatry 52, no. 6 (2002): 478–502; G. Gariepy, H. Honkaniemi, and A. Quesnel-Vallee, "Social Support and Protection from Depression: Systematic Review of Current Findings in Western Countries," British Journal of Psychiatry 209, no. 4 (2016): 284–293.
- 43 Из личного общения с Джеффрри Могилом 16 июля 2019 года.
- 44 J. Rodda, Z. Walker, and J. Carter, "Depression in Older Adults," British Medical Journal 343, no. 8 (2011): d5219.
- 45 H. Lavretsky et al., "Combined Citalopram and Methylphenidate Improved Treatment Response Compared to Either Drug Alone in Geriatric Depression: A Randomized Double-Blind, Placebo-Controlled Trial," American Journal of Psychiatry 172, no. 6 (2015): 561; T. A. Ketter et al., "Long-Term Safety and Efficacy of Armodafinil in Bipolar Depression: A 6-Month Open-Label Extension Study," Journal of Affective Disorders 197 (2016): 51–57.
- 46 K. N. Månsson et al., "Neuroplasticity in Response to Cognitive Behavior Therapy for Social Anxiety Disorder," Translational Psychiatry 6, no. 2 (2016): e727; D. Collerton, "Psychotherapy and Brain Plasticity," Frontiers in Psychology 4 (2013): 548.
- 47 R. D. Lane et al., "Memory Reconsolidation, Emotional Arousal, and the Process of Change in Psychotherapy: New Insights from Brain Science," Behavioral and Brain Sciences 38 (2015).
- 48 R. J. DeRubeis, G. J. Siegle, and S. D. Hollon, "Cognitive Therapy versus Medication for Depression: Treatment Outcomes and Neural Mechanisms," Nature Reviews Neuroscience 9, no. 10 (2008): 788.
- 49 Davidson et al., "Neural and Behavioral Substrates."

- 50 W. H. Frey II, Crying: The Mystery of Tears (Minneapolis, MN: Winston Press, 1985); R. Turner et al., "Effects of Emotion on Oxytocin, Prolactin, and ACTH in Women," Stress 5, no. 4 (2002): 269–276.
- 51 S. Nolen-Hoeksema, "Responses to Depression and Their Effects on the Duration of the Depressive Episode," Journal of Abnormal Psychology 100, no. 4 (1991): 569–582; S. Nolen-Hoeksema and J. Morrow, "Effects of Rumination and Distraction on Naturally Occurring Depressed Mood," Cognition and Emotion 7, no. 6 (1993): 561–570.
- 52 N. M. Morris and J. R. Udry, "Variations in Pedometer Activity during the Menstrual Cycle," Obstetrics and Gynecology 35, no. 2 (1970): 199–201; M. Haselton, Hormonal: The Hidden Intelligence of Hormones—How They Drive Desire, Shape Relationships, Influence Our Choices, and Make Us Wiser (Boston: Little, Brown, 2018).
- 53 S. J. Stanton and O. C. Schultheiss, "Basal and Dynamic Relationships between Implicit Power Motivation and Estradiol in Women," Hormones and Behavior 52, no. 5 (2007): 571–580; K. Lebron-Milad, B. M. Graham, and M. R. Milad, "Low Estradiol Levels: A Vulnerability Factor for the Development of Posttraumatic Stress Disorder," Biological Psychiatry 72, no. 1 (2012): 6–7, http://dx.doi. org/10.1016/j.biopsych.2012.04.029.
- 54 M. Østensen, P. M. Villiger, and F. Förger, "Interaction of Pregnancy and Autoimmune Rheumatic Disease," Autoimmunity Reviews 11, nos. 6–7 (2012): A437–A446.
- 55 J. Greenspan et al., "Studying Sex and Gender Differences in Pain and Analgesia: A Consensus Report," Pain 132 (2007): S26–S45.
- 56 M. L. Smith et al., "Facial Appearance Is a Cue to Oestrogen Levels in Women," Proceedings of the Royal Society of London B: Biological Sciences 273, no. 1583 (2006): 135–140; D. S. Fleischman and D. M. Fessler, "Progesterone's Effects on the Psychology of Disease Avoidance: Support for the Compensatory Behavioral Prophylaxis Hypothesis," Hormones and Behavior 59, no. 2 (2011): 271–275.
- 57 Haselton, Hormonal, p. 76.
- 58 O. C. Schultheiss, A. Dargel, and W. Rohde, "Implicit Motives and Gonadal Steroid Hormones: Effects of Menstrual Cycle Phase, Oral Contraceptive Use, and Relationship Status," Hormones and Behavior 43, no. 2 (2003): 293–301.
- 59 E. Timby et al., "Pharmacokinetic and Behavioral Effects of Allopregnanolone in Healthy Women," Psychopharmacology 186, no. 3 (2006): 414; A. Smith et al., "Cycles of Risk: Associations between Menstrual Cycle and Suicidal Ideation among Women," Personality and Individual Differences 74 (2015): 35–40.
- 60 C. Eisenegger, J. Haushofer, and E. Fehr, "The Role of Testosterone in Social Interaction," Trends in Cognitive Sciences 15, no. 6 (2011): 263–271.
- 61 S. J. Stanton, S. H. Liening, and O. C. Schultheiss, "Testosterone Is Positively Associated with Risk Taking in the Iowa Gambling Task," Hormones and Behavior 59, no. 2 (2011): 252–256; см. также: J. M. Coates and J. Herbert, "Endogenous Steroids and Financial Risk Taking on a London Trading Floor," Proceedings of the National Academy of Sciences 105, no. 16 (2008): 6167–6172.

- 62 S. M. van Anders, L. D. Hamilton, and N. V. Watson, "Multiple Partners Are Associated with Higher Testosterone in North American Men and Women," Hormones and Behavior 51, no. 3 (2007): 454–459.
- 63 S. L. Miller, and J. K. Maner, "Scent of a Woman: Men's Testosterone Responses to Olfactory Ovulation Cues," Psychological Science 21, no. 2 (2010): 276–283.
- 64 O. C. Schultheiss, K. L. Campbell, and D. C. McClelland, "Implicit Power Motivation Moderates Men's Testosterone Responses to Imagined and Real Dominance Success," Hormones and Behavior 36, no. 3 (1999): 234–241.
- 65 M. Ritschard et al., "Enhanced Testosterone Levels Affect Singing Motivation but Not Song Structure and Amplitude in Bengalese Finches," Physiology and Behavior 102, no. 1 (2011): 30–35.
- 66 Eisenegger et al., "The Role of Testosterone in Social Interaction."
- 67 Committee on How People Learn II, How People Learn II: Learners, Contexts and Cultures (Washington, DC: National Academies Press, 2018), p. 21, доступно: http://nap.edu/24783.
- 68 Из личного общения с Полом Саймоном 19 сентября 2013 года.
- 69 R. Lewis, "No Longer Singing, Linda Ronstadt's Latest Tour Is a Conversation with the Audience," Los Angeles Times, October 3, 2018, http://www.latimes.com/entertainment/music/la-et-ms-linda-ronstadt-conversation-20181003-story.html.
- 70 Из личного общения с Полом Саймоном, Нью-Йорк, 4 марта 2009 года.
- 71 Committee on How People Learn II, How People Learn II, p. 21.
- 72 P. L. Ackerman and M. E. Beier, "Determinants of Domain Knowledge and Independent Study Learning in an Adult Sample," Journal of Educational Psychology 98, no. 2 (2006): 366–381; M. E. Beier and P. L. Ackerman, "Determinants of Health Knowledge: An Investigation of Age, Gender, Abilities, Personality, and Interests," Journal of Personality and Social Psychology 84, no. 2 (2003): 439–448; M. E. Beier and P. L. Ackerman, "Age, Ability, and the Role of Prior Knowledge on the Acquisition of New Domain Knowledge: Promising Results in a Real-World Learning Environment," Psychology and Aging 20, no. 2 (2005): 341–355, http://dx.doi.org/10.1037/0882-7974.20.2.341; M. E. Beier, C. K. Young, and A. J. Villado, "Job Knowledge: Its Definition, Development and Measurement," in The Handbook of Industrial, Work, and Organization Psychology, ed. D. Ones et al. (Los Angeles, CA: Sage, 2018).
- 73 V. L. Patel, G. J. Groen, and C. H. Frederiksen, "Differences between Medical Students and Doctors in Memory for Clinical Cases," Medical Education 20, no. 1 (1986): 3–9; см. также: В. L. AndersonMontoya et al., "Running Memory for Clinical Handoffs: A Look at Active and Passive Processing," Human Factors 59, no. 3 (2017): 393–406.
- 74 E. L. Deci and R. M. Ryan, Intrinsic Motivation and Self-Determination in Human Behavior (New York: Plenum Press, 1985); E. L. Deci and R. M. Ryan, "The 'What' and 'Why' of Goal Pursuits: Human Needs and the Self-Determination of Behavior," Psychological Inquiry 11 (2000): 227–268; R. M. Ryan and E. L. Deci, Self-Determination Theory: Basic Psychological Needs in Motivation, Development, and Wellness (New York: Guilford Publications, 2017).

- 75 C. S. Dweck, "Even Geniuses Work Hard," Educational Leadership 68, no. 1 (2010): 16–20.
- 76 С. S. Dweck, Mindset: The New Psychology of Success (New York: Penguin Random House, 2008). (Дуж К. Гибкое сознание. Новый взгляд на психологию развития взрослых и детей. М.: Манн, Иванов и Фербер, 2013).
- 77 Некоторые из этих тезисов взяты из: S. Levitin, Heart and Sell (Wayne, NJ: Career Press, 2017), p. 31.
- 78 C. Dweck, "Carol Dweck Revisits the Growth Mindset," Education Week 35, no. 5 (2015): 20–24.
- 79 Committee on How People Learn II, How People Learn II, p. 21; L. L. Carstensen, D. M. Isaacowitz, and S. T. Charles, "Taking Time Seriously: A Theory of Socioemotional Selectivity," American Psychologist 54, no. 3 (1999): 165–181.
- 80 D. J. Levitin, "Severed," The New Yorker, October 10, 2018, https://www.newyorker.com/culture/personal-history/severed.
- 81 Из личного общения с Тимом Лэддишем 29 октября 2018 года.
- 82 P. Brickman, D. Coates, and R. Janoff-Bulman, "Lottery Winners and Accident Victims: Is Happiness Relative?," Journal of Personality and Social Psychology 36, no. 8 (1978): 917.
- 83 См. также: D. A. Schkade and D. Kahneman, "Does Living in California Make People Happy? A Focusing Illusion in Judgments of Life Satisfaction," Psychological Science 9, no. 5 (1998): 340–346; D. Gilbert, Stumbling on Happiness (Toronto: Vintage Canada, 2009); S. Lyubomirsky, The Myths of Happiness: What Should Make You Happy, but Doesn't, What Shouldn't Make You Happy, but Does (New York: Penguin, 2014).
- 84 Из личного общения с Висенте Фоксом, Леон, Мексика, 18 мая 2018 года.

## ГЛАВА 6

1 Я начинаю главу с этой цитаты, поскольку она широко известна и звучит актуально для многих из нас. Нам понятно стремление оградить себя от требований и раздражающего характера других людей. Однако это ошибочная интерпретация слов Сартра. Он не имел в виду, что человек становится счастливее в изоляции. На самом деле он хотел сказать, что мы не можем избежать суждений других людей, их пристального внимания и того стыда, который ощущаем, когда они видят наши недостатки. Полная цитата из пьесы No Exit («За закрытыми дверями») звучит так: «Эти пожирающие взгляды... А! Вас только двое? Я думал: гораздо больше. Так вот он какой, ад! Никогда бы не подумал... Помните: сера, решетки, жаровня... Чепуха все это! На кой черт жаровня? Ад — это другие» (перевод Л. Каменской). P. Caws, "To Hell and Back: Sartre on (and in) Analysis with Freud," Sartre Studies International 11, no. 1 (2005): 166-176. Сам Сартр сказал об этом следующее: «Фразу "Ад — это другие" всегда понимали неправильно. Принято считать, что я имел в виду, будто наши отношения с другими людьми всегда отравлены, будто это неизбежно адские отношения. Однако я имел в виду нечто совершенно иное. Я хотел сказать, что, если отношения с кем-то запутанны, испорчены,

этот человек действительно может быть только адом. Почему? Потому что... когда мы размышляем о себе, когда пытаемся познать себя... мы используем то знание себя, которое уже есть у других людей. Мы оцениваем себя с помощью тех инструментов, которые есть у других людей и которые они нам предоставили, для того чтобы мы оценивали себя. В то, что я говорю о себе, всегда вмешивается чье-то суждение. В то, что я ощущаю внутри, всегда вмешивается чье-то суждение. ... Однако это совсем не значит, что нельзя поддерживать взаимоотношения с другими людьми. Это просто подчеркивает исключительное значение людей для каждого из нас».

- 2 L. C. Hawkley and J. T. Cacioppo, "Loneliness Matters: A Theoretical and Empirical Review of Consequences and Mechanisms," Annals of Behavioral Medicine 40, no. 2 (2010): 218–227.
- 3 L. M. Jaremka et al., "Loneliness Promotes Inflammation during Acute Stress," Psychological Science 24, no. 7 (2013): 1089–1097.
- 4 A. M. Stranahan, D. Khalil, and E. Gould, "Social Isolation Delays the Positive Effects of Running on Adult Neurogenesis," Nature Neuroscience 9, no. 4 (2006): 526.
- 5 J. McGregor, "This Former Surgeon General Says There's a Loneliness Epidemic and Work Is Partly to Blame," The Washington Post, October 4, 2017, https://www.washingtonpost.com/news/on-leadership/wp/2017/10/04/this-former-surgeongeneral-says-theres-a-loneliness-epidemic-and-work-is-partly-to-blame/.
- 6 J. Holt-Lunstad et al., "Loneliness and Social Isolation as Risk Factors for Mortality: A Meta-Analytic Review," Perspectives on Psychological Science 10, no. 2 (2015): 227–237.
- 7 Holt-Lunstad et al., "Loneliness and Social Isolation."
- 8 R. D. Putnam, "Bowling Alone: America's Declining Social Capital," in Culture and Politics, ed. L. Crothers and C. Lockhart, pp. 223–234 (New York: Palgrave Macmillan, 2000).
- 9 E. Klinenberg, "Is Loneliness a Health Epidemic?," The New York Times, February 9, 2018, https://www.nytimes.com/2018/02/09/opinion/sunday/loneliness-health. html.
- 10 Я писал об этом ранее в книге: D. J. Levitin, The Organized Mind (New York: Dutton, 2014). (*Левитин Д.* Организованный ум. Как мыслить и принимать решения в эпоху информационной перегрузки. М.: Манн, Иванов и Фербер, 2019.)
- 11 M. Ankarcrona et al., "Glutamate-Induced Neuronal Death: A Succession of Necrosis or Apoptosis Depending on Mitochondrial Function," Neuron 15, no. 4 (1995): 961–973; R. Sattler and M. Tymianski, "Molecular Mechanisms of Glutamate Receptor-Mediated Excitotoxic Neuronal Cell Death," Molecular Neurobiology 24, nos. 1–3 (2001): 107–129.
- 12 R. A. Hawkins, "The Blood-Brain Barrier and Glutamate," American Journal of Clinical Nutrition 90, no. 3 (2009): 867S–874S; M. B. Bogdanov and R. J. Wurtman, "Effects of Systemic or Oral Ad Libitum Monosodium Glutamate Administration on Striatal Glutamate Release, as Measured Using Microdialysis in Freely Moving Rats," Brain Research 660, no. 2 (1994): 337–340.

- 13 F. X. Vollenweider and M. Kometer, "The Neurobiology of Psychedelic Drugs: Implications for the Treatment of Mood Disorders," Nature Reviews Neuroscience 11, no. 9 (2010): 642.
- 14 S. W. Cole et al., "Myeloid Differentiation Architecture of Leukocyte Transcriptome Dynamics in Perceived Social Isolation," Proceedings of the National Academy of Sciences 112, no. 49 (2015): 15142–15147.
- 15 J. Rodriguez-Romaguera and G. D. Stuber, "Social Isolation Co-opts Fear and Aggression Circuits," Cell 173, no. 5 (2018): 1071–1072.
- 16 K. Asahina et al., "Tachykinin Expressing Neurons Control Male-Specific Aggressive Arousal in Drosophila," Cell 156, no. 1 (2014): 221–235.
- 17 Y. Yang et al., "Neural Correlates of Proactive and Reactive Aggression in Adolescent Twins," Aggressive Behavior 43, no. 3 (2017): 230–240.
- 18 Yang et al., "Neural Correlates."
- 19 L. W. De Jong et al., "Strongly Reduced Volumes of Putamen and Thalamus in Alzheimer's Disease: An MRI Study," Brain 131, no. 12 (2008): 3277–3285.
- 20 F. Caravaggio et al., "Exploring Personality Traits Related to Dopamine D Receptor Availability in Striatal Subregions of Humans," European Neuropsychopharmacology 26, no. 4 (2016): 644–652; A. Laakso et al., "Prediction of Detached Personality in Healthy Subjects by Low Dopamine Transporter Binding," American Journal of Psychiatry 157, no. 2 (2000): 290–292.
- 21 H. F. Harlow and S. J. Suomi, "Social Recovery by Isolation-Reared Monkeys," Proceedings of the National Academy of Sciences 68, no. 7 (1971): 1534–1538.
- 22 Å. M. Hansen et al., "School Education, Physical Performance in Late Midlife and Allostatic Load: A Retrospective Cohort Study," Journal of Epidemiology and Community Health 70 (2016): 748–754.
- 23 H. D. Chapin, "Are Institutions for Infants Necessary?," Journal of the American Medical Association 64, no. 1 (1915): 1–3.
- 24 T. Bahrampour, "A Lost Boy Finds His Calling," The Washington Post, January 30, 2014, https://www.washingtonpost.com/sf/style/2014/01/30/a-lost-boy-finds-his-calling/?utm\_term=.cc5a7ffce49d.
- 25 K. L. Humphreys et al., "Foster Care Promotes Adaptive Functioning in Early Adolescence among Children Who Experienced Severe, Early Deprivation," Journal of Child Psychology and Psychiatry 59, no. 7 (2018): 811–821.
- 26 T. Bahrampour, "Romanian Orphans Subjected to Deprivation Must Now Deal with Dysfunction," The Washington Post, January 30, 2014, https://www.washingtonpost.com/local/romanian-orphans-subjected-to-deprivation-must-now-deal-with-disfunction/2014/01/30/a9dbea6c-5d13-11e3-be07-006c776266ed\_story.html?utm\_term=.478da5126060.
- 27 E. Fombonne et al., "Prevalence of Autism Spectrum Disorders in Guanajuato, Mexico: The Leon Survey," Journal of Autism and Developmental Disorders 46, no. 5 (2016): 1669–1685.
- 28 D. Khullar, "How Social Isolation Is Killing Us," The New York Times, December 22, 2016, https://www.nytimes.com/2016/12/22/upshot/how-social-isolation-is-killing-us.html.

- 29 K. Asahina et al., "Tachykinin-Expressing Neurons Control Male-Specific Aggressive Arousal in Drosophila," Cell 156, no. 1 (2014): 221–235.
- 30 J. Shih, R. Hodge, and M. A. Andrade Navarro, "Comparison of Inter-and Intraspecies Variation in Humans and Fruit Flies," Genomics Data 3 (2015): 49–54.
- 31 M. Zelikowsky et al., "The Neuropeptide Tac2 Controls a Distributed Brain State Induced by Chronic Social Isolation Stress," Cell 173, no. 5 (2018): 1265–1279.
- 32 Cell Press, "One Way Social Isolation Changes the Mouse Brain," EurekAlert!, May 17, 2018, https://www.eurekalert.org/pub\_releases/2018-05/cp-ows051018. php; см. также: Zelikowsky et al., "The Neuropeptide Tac2."
- 33 V. Trezza et al., "Nucleus Accumbens μ-Opioid Receptors Mediate Social Reward," Journal of Neuroscience 31, no. 17 (2011): 6362–6370.
- 34 Trezza et al., "Nucleus Accumbens μ-Opioid Receptors."
- 35 M. L. Chanda and D. J. Levitin, "The Neurochemistry of Music," Trends in Cognitive Sciences 17, no. 4 (2013): 179–193; V. Menon and D. J. Levitin, "The Rewards of Music Listening: Response and Physiological Connectivity of the Mesolimbic System," Neuroimage 28, no. 1 (2005): 175–184.
- 36 S. M. Wang et al., "Five Potential Therapeutic Agents as Antidepressants: A Brief Review and Future Directions," Expert Review of Neurotherapeutics 15, no. 9 (2015): 1015–1029.
- 37 H. M. Nordahl et al., "Paroxetine, Cognitive Therapy or Their Combination in the Treatment of Social Anxiety Disorder with and without Avoidant Personality Disorder: A Randomized Clinical Trial," Psychotherapy and Psychosomatics 85, no. 6 (2016): 346–356.
- 38 L. C. Hawkley and J. T. Cacioppo, "Loneliness Matters: A Theoretical and Empirical Review of Consequences and Mechanisms," Annals of Behavioral Medicine 40, no. 2 (2010): 218–227; S. Ni et al., "Effect of Gratitude on Loneliness of Chinese College Students: Social Support as a Mediator," Social Behavior and Personality 43, no. 4 (2015): 559–566.
- 39 C. Lim and R. D. Putnam, "Religion, Social Networks, and Life Satisfaction," American Sociological Review 75, no. 6 (2010): 914–933.
- 40 Khullar, "How Social Isolation Is Killing Us."
- 41 Canadian Longitudinal Study on Aging, "Canadian Longitudinal Study on Aging Releases First Report on Health and Aging in Canada," May 22, 2018, https://www.clsa-elcv.ca/stay-informed/new-clsa/2018/canadian-longitudinal-study-aging-releases-first-report-health-and-aging.
- 42 Befriending Networks, "What Is Befriending?," https://www.befriending.co.uk/aboutbefriending.php.
- 43 https://www.broomhousecentre.org.uk/our-projects/youth-befriending/befriender-quotes-and-case-studies/.
- 44 K. T. K. Lim and R. Yu, "Aging and Wisdom: Age-Related Changes in Economic and Social Decision Making," Frontiers in Aging Neuroscience 7 (2015): 120.
- 45 Структура и идеи этого фрагмента сформированы под влиянием статьи Лима и Ю: Lim and Yu, "Aging and Wisdom."
- 46 L. L. Carstensen and B. L. Fredrickson, "Influence of HIV Status and Age on Cognitive Representations of Others," Health Psychology 17, no. 6 (1998):

- 494; L. L. Carstensen, D. M. Isaacowitz, and S. T. Charles, "Taking Time Seriously: A Theory of Socioemotional Selectivity," American Psychologist 54, no. 3 (1999): 165; L. L. Carstensen, H. H. Fung, and S. T. Charles, "Socioemotional Selectivity Theory and the Regulation of Emotion in the Second Half of Life," Motivation and Emotion 27, no. 2 (2003): 103–123; C. E. Löckenhoff and L. L. Carstensen, "Socioemotional Selectivity Theory, Aging, and Health: The Increasingly Delicate Balance between Regulating Emotions and Making Tough Choices," Journal of Personality 72, no. 6 (2004): 1395–1424; L. L. Carstensen, "The Influence of a Sense of Time on Human Development," Science 312, no. 5782 (2006): 1913–1915.
- 47 J. Heckhausen, C. Wrosch, and R. Schulz, "A Motivational Theory of Life-Span Development," Psychological Review 117, no. 1 (2010): 32.
- 48 T. Hedden and J. D. Gabrieli, "Insights into the Ageing Mind: A View from Cognitive Neuroscience," Nature Reviews Neuroscience 5, no. 2 (2004): 87.
- 49 Löckenhoff and Carstensen, "Socioemotional Selectivity Theory."
- 50 L. A. Leotti, S. S. Iyengar, and K. N. Ochsner, "Born to Choose: The Origins and Value of the Need for Control," Trends in Cognitive Sciences 14, no. 10 (2010): 457–463.
- 51 E. J. Langer and J. Rodin, "The Effects of Choice and Enhanced Personal Responsibility for the Aged: A Field Experiment in an Institutional Setting," Journal of Personality and Social Psychology 34, no. 2 (1976): 191.
- 52 A. Bandura and R. Wood, "Effect of Perceived Controllability and Performance Standards on SelfRegulation of Complex Decision Making," Journal of Personality and Social Psychology 56, no. 5 (1989): 805.
- 53 E. M. Tricomi, M. R. Delgado, and J. A. Fiez, "Modulation of Caudate Activity by Action Contingency," Neuron 41, no. 2 (2004): 281–292; G. Coricelli et al., "Regret and Its Avoidance: A Neuroimaging Study of Choice Behavior," Nature Neuroscience 8, no. 9 (2005): 1255.
- 54 Leotti, Iyengar, and Ochsner, "Born to Choose."
- 55 R. M. Ryan et al., "The Significance of Autonomy and Autonomy Support in Psychological Development and Psychopathology," in Developmental Psychopathology, vol. 1, Theory and Method, ed. D. Cicchetti and D. J. Cohen, pp. 795–849 (Hoboken, NJ: John Wiley and Sons, 2015).
- 56 C. Kilgannon, "The World's Oldest Barber Is 107 and Still Cutting Hair Full Time," The New York Times, October 7, 2018, https://www.nytimes.com/2018/10/07/nyregion/worlds-oldest-barber-anthony-mancinelli.html.
- 57 Y. Hayashi and R. Tracy, "Partisan or Deal Maker? Maxine Waters Rises as Banking Industry's Overseer," The Wall Street Journal, November 20, 2018, https://www.wsj.com/articles/partisan-or-deal-maker-maxine-waters-rises-as-banking-industrys-overseer-1542717000.
- 58 A. P. Shimamura, Get SMART! Five Steps toward a Healthy Brain (Scotts Valley, CA: CreateSpace, 2017).
- 59 Shimamura, Get SMART!.
- 60 Там же.

- 61 N. D. Anderson et al., "The Benefits Associated with Volunteering among Seniors: A Critical Review and Recommendations for Future Research," Psychological Bulletin 140, no. 6 (2014): 1505.
- 62 Anderson et al., "The Benefits Associated with Volunteering."
- 63 International Labour Organization, Manual on the Measurement of Volunteer Work (Geneva, Switzerland: International Labour Organization, 2011).
- 64 M. C. Carlson et al., "Exploring the Effects of an 'Everyday' Activity Program on Executive Function and Memory in Older Adults: Experience Corps," Gerontologist 48 (2008): 793–801.
- 65 T. D. Windsor, K. J. Anstey, and B. Rodgers, "Volunteering and Psychological Well-Being among Young-Old Adults: How Much Is Too Much?," Gerontologist 48, no. 1 (2008): 59–70.

- 1 Подзаголовок этой главы взят из старого анекдота. Человек приходит к врачу и, резко толкая себя локтем в бок, говорит: «Мне больно, когда я это делаю». Врач отвечает: «Так не делайте этого!»
- 2 R. J. Gatchel et al., "The Biopsychosocial Approach to Chronic Pain: Scientific Advances and Future Directions," Psychological Bulletin 133, no. 4 (2007): 581.
- 3 C. S. Lin, S. Y. Wu, and C. A. Yi, "Association between Anxiety and Pain in Dental Treatment: A Systematic Review and Meta-analysis," Journal of Dental Research 96, no. 2 (2017): 153–162; M. Zhuo, "Neural Mechanisms Underlying Anxiety—Chronic Pain Interactions," Trends in Neurosciences 39, no. 3 (2016): 136–145.
- 4 N. D. Volkow and A. T. McLellan, "Opioid Abuse in Chronic Pain—Misconceptions and Mitigation Strategies," New England Journal of Medicine 374, no. 13 (2016): 1253–1263.
- 5 World Health Organization, "About the Global Burden of Disease (GBD) Project," https://www.who.int/healthinfo/global\_burden\_disease/about/en/; http://www.healthdata.org/data-visualization/gbd-compare; R. Lozano et al., "Global and Regional Mortality from 235 Causes of Death for 20 Age Groups in 1990 and 2010: A Systematic Analysis for the Global Burden of Disease Study 2010," Lancet 380, no. 9859 (2012): 2095–2128.
- 6 http://www.healthdata.org/data-visualization/gbd-compare.
- 7 D. J. Gaskin and P. Richard, "The Economic Costs of Pain in the United States," Journal of Pain 13, no. 8 (2012): 715–724.
- 8 N. D. Volkow and A. T. McLellan, "Opioid Abuse in Chronic Pain—Misconceptions and Mitigation Strategies," New England Journal of Medicine 374, no. 13 (2016): 1253–1263.
- 9 H. K. Beecher, "Pain in Men Wounded in Battle," Annals of Surgery 123, no. 1 (1946): 96.
- 10 Наблюдение о том, что можно провести различие между сенсорной и аффективной составляющей боли, стало основой статьи Мелзака и Уолла (1965 год), положившей начало современным исследованиям этой проблемы: R. Melzack and P. D. Wall, "Pain Mechanisms: A New Theory," Science 150 (1965):

- 971–979; см. также: J. Katz and B. N. Rosenbloom, "The Golden Anniversary of Melzack and Wall's Gate Control Theory of Pain: Celebrating 50 Years of Pain Research and Management," Pain Research and Management 20, no. 6 (2015): 285–286.
- 11 H. K. Beecher, "Relationship of Significance of Wound to Pain Experienced," Journal of the American Medical Association 161, no. 17 (1956): 1609–1613.
- 12 Melzack and Wall, "Pain Mechanisms."
- 13 R. Melzack, "The McGill Pain Questionnaire from Description to Measurement," Anesthesiology 103, no. 1 (2005): 199–202.
- 14 R. D. Treede et al., "The Cortical Representation of Pain," Pain 79, nos. 2–3 (1999): 105–111.
- 15 В коре головного мозга существует «карта» для отображения моторных движений, которую также составил Пенфилд, с линейной схемой того, как в мозге представлены мышцы от головы до пальца ноги. На мышцы лица и глотки приходится около 40 процентов двигательной коры головного мозга, а кистям рук соответствует еще 30 процентов. Следовательно, на управление всеми остальными частями тела приходится всего 30 процентов двигательной коры. Эти 70 процентов дают нам возможность разговаривать, жестикулировать во время беседы, а также играть на музыкальных инструментах; а еще 30 процентов, которые управляют кистями рук, это и есть то, что позволяет часовщикам, художникам и другим высококвалифицированным специалистам делать свое дело. Как показывают исследования, благодаря обучению и накоплению опыта соответствующие области мозга увеличиваются в размере.
- 16 M. C. Bushnell, M. Čeko, and L. A. Low, "Cognitive and Emotional Control of Pain and Its Disruption in Chronic Pain," Nature Reviews Neuroscience 14, no. 7 (2013): 502.
- 17 I. A. Strigo et al., "Psychophysical Analysis of Visceral and Cutaneous Pain in Human Subjects," Pain 97, no. 3 (2002): 235–246. Участников исследования подвергали тепловому воздействию, которое вызывало боль на поверхности грудной клетки, или в их пищевод вводили и надували воздушный шар. Воздушный шар в пищеводе вызывает дискомфорт, подобный ощущению от эндоректального зонда, который иногда используют в эндоскопии. На кожу испытуемых воздействовали температурой 46 градусов по Цельсию, а висцеральное давление составляло 40 миллиметров ртутного столба.
- 18 Strigo et al., "Psychophysical Analysis."
- 19 F. Cervero and L. A. Connell, "Distribution of Somatic and Visceral Primary Afferent Fibres within the Thoracic Spinal Cord of the Cat," Journal of Comparative Neurology 230, no. 1 (1984): 88–98; F. Cervero and L. A. Connell, "Fine Afferent Fibers from Viscera Do Not Terminate in the Substantia Gelatinosa of the Thoracic Spinal Cord," Brain Research 294, no. 2 (1984): 370–374.
- 20 I. A. Strigo et al., "Differentiation of Visceral and Cutaneous Pain in the Human Brain," Journal of Neurophysiology 89 (2003): 3294–3303.
- 21 I. A. Strigo et al., "The Effects of Racemic Ketamine on Painful Stimulation of Skin and Viscera in Human Subjects," Pain 113, no. 3 (2005): 255–264.

- 22 P. Raineville, "Brain Mechanisms of Pain Affect and Pain Modulation," Current Opinion in Neurobiology 12 (2002): 195–204.
- 23 L. Sztriha et al., "Congenital Insensitivity to Pain with Anhidrosis," Pediatric Neurology 25, no. 1 (2001): 63–66.
- 24 S. Mardy et al., "Congenital Insensitivity to Pain with Anhidrosis (CIPA): Effect of TRKA (NTRK1) Missense Mutations on Autophosphorylation of the Receptor Tyrosine Kinase for Nerve Growth Factor," Human Molecular Genetics 10, no. 3 (2001): 179–188.
- 25 NIH, US National Library of Medicine, Genetics Home Reference, "SCN9A Gene," https://ghr.nlm.nih.gov/gene/SCN9A#location.
- 26 E. M. Nagasako, A. L. Oaklander, and R. H. Dworkin, "Congenital Insensitivity to Pain: An Update," Pain 101, no. 3 (2003): 213–219.
- 27 P. D. Wall, Pain: The Science of Suffering (New York: Columbia University Press, 2000).
- 28 R. Y. Hwang et al., "Nociceptive Neurons Protect Drosophila Larvae from Parasitoid Wasps," Current Biology 17, no. 24 (2007): 2105–2116; Nagasako et al., "Congenital Insensitivity to Pain."
- 29 R. J. Crook et al., "Nociceptive Sensitization Reduces Predation Risk," Current Biology 24, no. 10 (2014): 1121–1125.
- 30 D. Netburn, "What Injured Squid Can Teach Us about Irritability and Pain," Los Angeles Times, May 8, 2014.
- 31 L. Tiemann et al., "Behavioral and Neuronal Investigations of Hypervigilance in Patients with Fibromyalgia Syndrome," PLoS One 7, no. 4 (2012): e35068.
- 32 S. Linton, Understanding Pain for Better Clinical Practice: A Psychological Perspective, vol. 16 (New York: Elsevier Health Sciences, 2005), p. 15.
- 33 R. Moore and I. Brodsgaard, "Cross-Cultural Investigations of Pain," Epidemiology of Pain (1999): 53–80.
- 34 Linton, Understanding Pain, p. 14.
- 35 Ibid, p. 3.
- 36 D. D. Price, D. G. Finniss, and F. Benedetti, "A Comprehensive Review of the Placebo Effect: Recent Advances and Current Thought," Annual Review of Psychology 59 (2008): 565–590.
- 37 R. Dobrila-Dintinjana and A. Načinović-Duletić, "Placebo in the Treatment of Pain," Collegium Antropologicum 35, no. 2 (2011): 319–323.
- 38 P. Tétreault et al., "Brain Connectivity Predicts Placebo Response across Chronic Pain Clinical Trials," PLoS Biology 14, no. 10 (2016): e1002570.
- 39 M. Cummings, "Modellvorhaben Akupunktur a Summary of the ART, ARC and GERAC Trials," Acupuncture in Medicine 27, no. 1 (2009): 26–30; K. Linde et al., "The Impact of Patient Expectations on Outcomes in Four Randomized Controlled Trials of Acupuncture in Patients with Chronic Pain," Pain 128, no. 3 (2007): 264–271; D. C. Cherkin et al., "A Randomized Trial Comparing Acupuncture, Simulated Acupuncture, and Usual Care for Chronic Low Back Pain," Archives of Internal Medicine 169, no. 9 (2009): 858–866.

- 40 J. S. Mogil et al., "Melanocortin-1 Receptor Gene Variants Affect Pain and μ-opioid Analgesia in Mice and Humans," Journal of Medical Genetics 42, no. 7 (2005): 583–587.
- 41 D. Francis et al., "Nongenomic Transmission across Generations of Maternal Behavior and Stress Responses in the Rat," Science 286, no. 5442 (1999): 1155–1158.
- 42 D. Kahneman et al., "When More Pain Is Preferred to Less: Adding a Better End," Psychological Science 4, no. 6 (1993): 401–405.
- 43 Linton, Understanding Pain, p. 14.
- 44 US Department of Health and Human Services, "What Is the U.S. Opioid Epidemic?," January 22, 2019, https://www.hhs.gov/opioids/about-the-epidemic/index.html; National Institute on Drug Abuse, "Opioid Overdose Crisis," January 2019, https://www.drugabuse.gov/drugs-abuse/opioids/opioid-overdose-crisis.
- 45 T. J. Atkinson et al., "Medication Pain Management in the Elderly: Unique and Underutilized Analgesic Treatment Options," Clinical Therapeutics 35, no. 11 (2013): 1669–1689.
- 46 B. R. Da Costa et al., "Effectiveness of Non-Steroidal Anti-Inflammatory Drugs for the Treatment of Pain in Knee and Hip Osteoarthritis: A Network Meta-Analysis," Lancet 390, no. 10090 (2017): e21–e33.
- 47 C. A. Heyneman, C. Lawless-Liday, and G. C. Wall, "Oral versus Topical NSAIDs in Rheumatic Diseases," Drugs 60, no. 3 (2000): 555–574.
- 48 C. Villemure et al., "Insular Cortex Mediates Increased Pain Tolerance in Yoga Practitioners," Cerebral Cortex 24, no. 10 (2013): 2732–2740. Было изучено несколько стилей йоги: практика физических поз (асана на санскрите), дыхательные упражнения (пранаяма), упражнения на концентрацию, которые направляют и стабилизируют внимание (дхарана), и медитация (дхьяна).
- 49 M. H. Pitcher et al., "Modest Amounts of Voluntary Exercise Reduce Pain-and Stress-Related Outcomes in a Rat Model of Persistent Hind Limb Inflammation," Journal of Pain 18, no. 6 (2017): 687–701.
- 50 Из личного общения с Джеффри Могилом 20 июля 2019 года.
- 51 R. W. Shields, "Peripheral Neuropathy," August 2010, www.clevelandclinicmeded. com/medicalpubs/diseasemanagement/neurology/peripheral-neuropathy/.
- 52 R. Hill, "NK1 (Substance P) Receptor Antagonists—Why Are They Not Analgesic in Humans?," Trends in Pharmacological Sciences 21, no. 7 (2000): 244–246.
- 53 K. Ebner and N. Singewald, "The Role of Substance P in Stress and Anxiety Responses," Amino Acids 31, no. 3 (2006): 251–272.
- 54 S. W. Park et al., "Substance P Is a Promoter of Adult Neural Progenitor Cell Proliferation under Normal and Ischemic Conditions," Journal of Neurosurgery 107, no. 3 (2007): 593–599.
- 55 T. W. Reid et al., "Stimulation of Epithelial Cell Growth by the Neuropeptide Substance P," Journal of Cellular Biochemistry 52, no. 4 (1993): 476–485; S. M. Brown et al., "Neurotrophic and Anhidrotic Keratopathy Treated with Substance P and Insulinlike Growth Factor 1," Archives of Ophthalmology 115, no. 7 (1997): 926–927.

- 56 V. Gangadharan and R. Kuner, "Pain Hypersensitivity Mechanisms at a Glance," Disease Models and Mechanisms 6, no. 4 (2013): 889–895.
- 57 A. Latremoliere and C. J. Woolf, "Central Sensitization: A Generator of Pain Hypersensitivity by Central Neural Plasticity," Journal of Pain 10, no. 9 (2009): 895–926.
- 58 A. B. Fleischer, T. J. Meade, and A. B. Fleischer, "Notalgia Paresthetica: Successful Treatment with Exercises," Acta Dermato-venereologica 91, no. 3 (2011): 356–357.
- 59 M. C. Bushnell, M. Čeko, and L. A. Low, "Cognitive and Emotional Control of Pain and Its Disruption in Chronic Pain," Nature Reviews Neuroscience 14, no. 7 (2013): 502.
- 60 N. J. Stagg et al., "Regular Exercise Reverses Sensory Hypersensitivity in a Rat Neuropathic Pain Model: Role of Endogenous Opioids," Anesthesiology 114, no. 4 (2011): 940–948.
- 61 Linton, Understanding Pain, p. 28.
- 62 K. B. Jensen et al., "Evidence of Dysfunctional Pain Inhibition in Fibromyalgia Reflected in rACC during Provoked Pain," Pain 144, nos. 1–2 (2009): 95–100; M. N. Baliki et al., "Chronic Pain and the Emotional Brain: Specific Brain Activity Associated with Spontaneous Fluctuations of Intensity of Chronic Back Pain," Journal of Neuroscience 26, no. 47 (2006): 12165–12173.
- 63 K. D. Davis and M. Moayedi, "Central Mechanisms of Pain Revealed through Functional and Structural MRI," Journal of Neuroimmune Pharmacology 8, no. 3 (2013): 518–534.
- 64 Из личного общения с Джеффри Могилом 5 июня 2018 года.
- 65 M. C. S. Rodrigues and C. D. Oliveira, "Drug-Drug Interactions and Adverse Drug Reactions in Polypharmacy among Older Adults: An Integrative Review," Revista Latino-Americana de Enfermagem (2016): 24.
- 66 O. C. Gleason, "Delirium," American Family Physician 67, no. 5 (2003): 1027–1034.

# ЧАСТЬ II

1 A. A. Kondratova and R. V. Kondratov, "The Circadian Clock and Pathology of the Ageing Brain," Nature Reviews Neuroscience 13, no. 5 (2012): 325.

- 1 Такое начало основано на вступительной части следующей статьи: U. Schibler and P. Sassone-Corsi, "A Web of Circadian Pacemakers," Cell 111, no. 7 (2002): 919–922.
- 2 T. Roenneberg and M. Merrow, "The Circadian Clock and Human Health," Current Biology 26, no. 10 (2016): R432–R443.
- 3 J. C. Dunlap and J. J. Loros, "Making Time: Conservation of Biological Clocks from Fungi to Animals," Microbiology Spectrum 5, no. 3 (2017).
- 4 R. Lehmann et al., "Morning and Evening Peaking Rhythmic Genes Are Regulated by Distinct Transcription Factors in Neurospora crassa," in Information and

- Communication Theory in Molecular Biology, ed. M. Bossert, Lecture Notes in Bioengineering (Cham, Switzerland: Springer, 2018).
- 5 L. L. Moroz et al., "Neuronal Transcriptome of Aplysia: Neuronal Compartments and Circuitry," Cell 127, no. 7 (2006): 1453–1467.
- 6 Genetic Science Learning Center, "The Time of Our Lives," March 1, 2016, https://learn.genetics.utah.edu/content/basics/clockgenes/.
- 7 O. Froy, "Circadian Rhythms, Aging, and Life Span in Mammals," Physiology 26, no. 4 (2011): 225–235; H. Li and E. Satinoff, "Fetal Tissue Containing the Suprachiasmatic Nucleus Restores Multiple Circadian Rhythms in Old Rats," American Journal of Physiology—Regulatory, Integrative and Comparative Physiology 275, no. 6 (1998): R1735–R1744.
- 8 Предположительно часы есть в каждой клетке человека. Например, они обнаружены в надпочечниках, пищеводе, легких, печени, поджелудочной железе, селезенке, вилочковой железе, коже и головном мозге.
- 9 S. B. S. Khalsa et al., "A Phase Response Curve to Single Bright Light Pulses in Human Subjects," Journal of Physiology 549, no. 3 (2003): 945–952; K. N. Paul, T. B. Saafir, and G. Tosini, "The Role of Retinal Photoreceptors in the Regulation of Circadian Rhythms," Reviews in Endocrine and Metabolic Disorders 10, no. 4 (2009): 271–278; J. M. Zeitzer et al., "Response of the Human Circadian System to Millisecond Flashes of Light," PLoS One 6, no. 7 (2011): e22078; P. C. Zee and P. Manthena, "The Brain's Master Circadian Clock: Implications and Opportunities for Therapy of Sleep Disorders," Sleep Medicine Reviews 11, no. 1 (2007): 59–70.
- 10 C. Dibner and U. Schibler, "Circadian Timing of Metabolism in Animal Models and Humans," Journal of Internal Medicine 277, no. 5 (2015): 513–527.
- 11 S. Hood and S. Amir, "The Aging Clock: Circadian Rhythms and Later Life," Journal of Clinical Investigation 127, no. 2 (2017): 437–446.
- 12 G. Asher and P. Sassone-Corsi, "Time for Food: The Intimate Interplay between Nutrition, Metabolism, and the Circadian Clock," Cell 161 (2015): 84–93.
- 13 Asher and Sassone-Corsi, "Time for Food."
- 14 T. Roenneberg, "What Is Chronotype?," Sleep and Biological Rhythms 10, no. 2 (2012): 75–76; T. Roenneberg, A. WirzJustice, and M. Merrow, "Life between Clocks: Daily Temporal Patterns of Human Chronotypes," Journal of Biological Rhythms 18, no. 1 (2003): 80–90.
- 15 E. Laber-Warren, "Up for the Job? Check the Clock," The New York Times, December 25, 2018, p. D1.
- 16 C. Vetter et al., "Aligning Work and Circadian Time in Shift Workers Improves Sleep and Reduces Circadian Disruption," Current Biology 25, no. 7 (2015): 907–911.
- 17 Laber-Warren, "Up for the Job?"
- 18 S. Horstmann et al., "Sleepiness-Related Accidents in Sleep Apnea Patients," Sleep 23, no. 3 (2000): 383–392.
- 19 W. Shakespeare, The Tragedy of Hamlet, act 3, scene 2. (Уильям Шекспир. Гамлет. Акт 3, сцена 2. Перевод М. Лозинского).

- 20 D. R. Samson et al., "Chronotype Variation Drives Night-Time Sentinel-like Behaviour in Hunter-Gatherers," Proceedings of the Royal Society B: Biological Sciences 284, no. 1858 (2017): 20170967.
- 21 D. A. Kalmbach et al., "Genetic Basis of Chronotype in Humans: Insights from Three Landmark GWAS," Sleep 40, no. 2 (2017).
- 22 S. E. Jones et al., "Genome-wide Association Analyses of Chronotype in 697,828 Individuals Provides Insights into Circadian Rhythms," Nature Communications 10, no. 1 (2019): 343.
- 23 Samson et al., "Chronotype Variation."
- 24 F. Marlowe, The Hadza: Hunter-Gatherers of Tanzania (Berkeley: University of California Press, 2010).
- 25 S. Michel, G. D. Block, and J. H. Meijer, "The Aging Clock," in Circadian Medicine, 1st ed., ed. C. S. Colwell, pp. 321–335 (Hoboken, NJ: John Wiley and Sons, 2015).
- 26 M. W. Hurd and M. R. Ralph, "The Significance of Circadian Organization for Longevity in the Golden Hamster," Journal of Biological Rhythms 13, no. 5 (1998): 430–436; H. Li and E. Satinoff, "Fetal Tissue Containing the Suprachiasmatic Nucleus Restores Multiple Circadian Rhythms in Old Rats," American Journal of Physiology— Regulatory, Integrative and Comparative Physiology 275, no. 6 (1998): R1735–R1744.
- 27 Hood and Amir, "The Aging Clock."
- 28 D. G. Harper et al., "Dorsomedial SCN Neuronal Subpopulations Subserve Different Functions in Human Dementia," Brain 131, no. 6 (2008): 1609–1617; Michel et al., "The Aging Clock."
- 29 M. H. Smolensky et al., "Circadian Disruption: New Clinical Perspective of Disease Pathology and Basis for Chronotherapeutic Intervention," Chronobiology International 33, no. 8 (2016): 1101–1119.
- 30 Michel et al., "The Aging Clock."
- 31 S. Forbes-Robertson et al., "Circadian Disruption and Remedial Interventions," Sports Medicine 42, no. 3 (2012): 185–208.
- 32 M. P. Mattson et al., "Meal Frequency and Timing in Health and Disease," Proceedings of the National Academy of Sciences 111, no. 47 (2014): 16647–16653.
- 33 C. B. Forsyth et al., "Circadian Rhythms, Alcohol and Gut Interactions," Alcohol 49, no. 4 (2015): 389–398; G. R. Swanson et al., "Decreased Melatonin Secretion Is Associated with Increased Intestinal Permeability and Marker of Endotoxemia in Alcoholics," American Journal of Physiology— Gastrointestinal and Liver Physiology 308, no. 12 (2015): G1004–G1011.
- 34 K. Eckel-Mahan and P. Sassone-Corsi, "Metabolism and the Circadian Clock Converge," Physiological Reviews 93, no. 1 (2013): 107–135; V. Leone et al., "Effects of Diurnal Variation of Gut Microbes and High-Fat Feeding on Host Circadian Clock Function and Metabolism," Cell Host and Microbe 17, no. 5 (2015): 681–689; A. Zarrinpar et al., "Diet and Feeding Pattern Affect the Diurnal Dynamics of the Gut Microbiome," Cell Metabolism 20, no. 6 (2014): 1006–1017.
- 35 Kondratova and Kondratov, "The Circadian Clock"; R. F. Riemersma-Van Der Lek et al., "Effect of Bright Light and Melatonin on Cognitive and Noncognitive

- Function in Elderly Residents of Group Care Facilities: A Randomized Controlled Trial," Journal of the American Medical Association 299, no. 22 (2008): 2642–2655.
- 36 D. P. Cardinali, A. M. Furio, and L. I. Brusco, "Clinical Aspects of Melatonin Intervention in Alzheimer's Disease Progression," Current Neuropharmacology 8, no. 3 (2010): 218–227.
- 37 R. Hornedo-Ortega et al., "In Vitro Effects of Serotonin, Melatonin, and Other Related Indole Compounds on Amyloid- Kinetics and Neuroprotection," Molecular Nutrition and Food Research 62, no. 3 (2018): 1700383; M. Shukla et al., "Mechanisms of Melatonin in Alleviating Alzheimer's Disease," Current Neuropharmacology 15, no. 7 (2017): 1010–1031.
- 38 A. de Jonghe et al., "Effectiveness of Melatonin Treatment on Circadian Rhythm Disturbances in Dementia. Are There Implications for Delirium? A Systematic Review," International Journal of Geriatric Psychiatry 25, no. 12 (2010): 1201–1208.
- 39 A. J. Lewy, "Circadian Misalignment in Mood Disturbances," Current Psychiatry Reports 11, no. 6 (2009): 459; A. J. Lewy, "Clinical Implications of the Melatonin Phase Response Curve," Journal of Clinical Endocrinology and Metabolism 95, no. 7 (2010): 3158–3160.
- 40 Из личного общения с Альфонсо Падильей 26 августа 2019 года.
- 41 A. M. Schroeder et al., "Voluntary Scheduled Exercise Alters Diurnal Rhythms of Behaviour, Physiology and Gene Expression in Wild-Type and Vasoactive Intestinal Peptide-Deficient Mice," Journal of Physiology 590, no. 23 (2012): 6213–6226; Y. Yamanaka et al., "Physical Exercise Accelerates Reentrainment of Human Sleep-Wake Cycle but Not of Plasma Melatonin Rhythm to 8-H Phase-Advanced Sleep Schedule," American Journal of Physiology—Regulatory, Integrative and Comparative Physiology 298, nos. 3 (2009): R681–R691.
- 42 J. W. Daly, J. Holmen, and B. B. Fredholm, "Is Caffeine Addictive? The Most Widely Used Psychoactive Substance in the World Affects Same Parts of the Brain as Cocaine," Lakartidningen 95, nos. 51–52 (1998): 5878–5883.
- 43 M. Lazarus et al., "Adenosine and Sleep," in Handbook of Experimental Pharmacology, ed. J. Barret (Berlin: Springer, 2017).
- 44 T. M. Burke et al., "Effects of Caffeine on the Human Circadian Clock In Vivo and In Vitro," Science Translational Medicine 7, no. 305 (2015): 305ra146.
- 45 Clark and Landolt, "Coffee, Caffeine, and Sleep."
- 46 Burke et al., "Effects of Caffeine."
- 47 M. Lastella et al., "The Chronotype of Elite Athletes," Journal of Human Kinetics 54, no. 1 (2016): 219–225.
- 48 L. C. Roden, T. D. Rudner, and D. E. Rae, "Impact of Chronotype on Athletic Performance: Current Perspectives," ChronoPhysiology and Therapy 7 (2017): 1–6; J. A. Vitale and A. Weydahl, "Chronotype, Physical Activity, and Sport Performance: A Systematic Review," Sports Medicine 47, no. 9 (2017): 1859–1868.
- 49 S. Forbes-Robertson et al., "Circadian Disruption and Remedial Interventions," Sports Medicine 42, no. 3 (2012): 185–208.
- 50 J. Roy and G. Forest, "Greater Circadian Disadvantage during Evening Games for the National Basketball Association (NBA), National Hockey League (NHL) and National Footb all League (NFL) Teams Travelling Westward," Journal of Sleep

- Research 27, no. 1 (2017): 86–89; A. Song, T. Severini, and R. Allada, "How Jet Lag Impairs Major League Baseball Performance," Proceedings of the National Academy of Sciences 114, no. 6 (2017): 1407–1412.
- 51 Kondratova and Kondratov, "The Circadian Clock."

- 1 S. Agarwal and A. V. Rao, "Tomato Lycopene and Its Role in Human Health and Chronic Diseases," Canadian Medical Association Journal 163, no. 6 (2000): 739–744; A. V. Rao and L. G. Rao, "Carotenoids and Human Health," Pharmacological Research 55, no. 3 (2007): 207–216.
- 2 J. C. Tilburt, M. Allyse, and F. W. Hafferty, "The Case of Dr. Oz: Ethics, Evidence, and Does Professional Self-Regulation Work?," AMA Journal of Ethics 19, no. 2 (2017): 199–206.
- 3 A. Astrup and M. F. Hjorth, "Low-Fat or Low Carb for Weight Loss? It Depends on Your Glucose Metabolism," EBioMedicine 22 (2017): 20–21.
- 4 R. H. Eckel, ed., Obesity: Mechanisms and Clinical Management (Philadelphia: Lippincott Williams and Wilkins, 2003).
- 5 E. Topol, "The A.I. Diet," The New York Times, March 3, 2019, p. SR1.
- 6 M. Müller and S. Kersten, "Nutrigenomics: Goals and Strategies," Nature Reviews Genetics 4, no. 4 (2003): 315.
- 7 S. Ipaktchian, "Read This and Lose 50 Pounds," Stanford Medicine Magazine, Fall 2007, http://sm.stanford.edu/archive/stanmed/2007fall/diet.html; см. также: С. D. Gardner et al., "Comparison of the Atkins, Zone, Ornish, and LEARN Diets for Change in Weight and Related Risk Factors among Overweight Premenopausal Women: The A to Z Weight Loss Study: A Randomized Trial," Journal of the American Medical Association 297, no. 9 (2007): 969–977.
- 8 R. H. Eckel, "The Dietary Approach to Obesity: Is It the Diet or the Disorder?," Journal of the American Medical Association 293, no. 1 (2005): 96–97.
- 9 M. L. Dansinger et al., "Comparison of the Atkins, Ornish, Weight Watchers, and Zone Diets for Weight Loss and Heart Disease Risk Reduction: A Randomized Trial," Journal of the American Medical Association 293, no. 1 (2005): 43–53.
- 10 C. B. Ebbeling et al., "Effects of a Low Carbohydrate Diet on Energy Expenditure during Weight Loss Maintenance: Randomized Trial," British Medical Journal 363 (2018): k4583.
- 11 K. D. Hall and J. Guo, "Carbs versus Fat: Does It Really Matter for Maintaining Lost Weight?," bioRxiv (2019): 476655.
- 12 N. Gonzalez, "The Gonzalez Protocol," n.d., https://www.dr-gonzalez.com/case-reports/.
- 13 S. Lerner, "When Medicine Is Murder," The Village Voice, March 26, 2002.
- 14 R. B. Phillips et al., "Lead, Mercury, and Arsenic in US-and Indian-manufactured Ayurvedic Medicines Sold via the Internet," Journal of the American Medical Association 300, no. 8 (2008): 915–923; Centers for Disease Control and Prevention, "Lead Poisoning Associated with Ayurvedic Medications—Five States, 2000–2003," Morbidity and Mortality Weekly Report 53, no. 26 (2004): 582–584.

- 15 Mayo Clinic Staff, "Integrative Medicine: Evaluate CAM Claims," 2018, https://www.mayoclinic.org/healthy-lifestyle/consumer-health/in-depth/alternative-medicine/art-20046087.
- 16 M. Wenner Moyer, "Why Almost Everything Dean Ornish Says about Nutrition Is Wrong," Scientific American, 2015, https://www.scientificamerican.com/article/why-almost-everything-dean-ornish-says-about-nutrition-is-wrong/.
- 17 S. Liou, "About Free Radical Damage," Huntington's Outreach Project for Education at Stanford, June 29, 2011, https://hopes.stanford.edu/about-free-radical-damage/.
- 18 T. A. Polk, The Aging Brain (Chantilly, VA: The Great Courses, 2016); Khan Academy, "Introduction to Cellular Respiration and Redox," n.d., https:// www.khanacademy.org/science/biology/cellular-respiration-and-fermentation/ intro-to-cellular-respiration/a/intro-to-cellular-respiration-and-redox; R. Boumis, "What Is Being Oxidized and What Is Being Reduced in Cell Respiration?," Sciencing, May 29, 2019, https://sciencing.com/being-oxidized-being-reduced-cell-respiration-17081.html. Следующий отрывок из статьи Лобо и соавторов позволяет заполнить некоторые пробелы. «Термин [оксидативный стресс используется для описания окислительного повреждения, наступающего в тех случаях, когда важнейшее равновесие между образованием свободных радикалов и антиоксидантной защитой неблагоприятно. Оксидативный стресс, возникающий из-за дисбаланса между образованием свободных радикалов и антиоксидантной защитой, связан с повреждением широкого диапазона молекулярных частиц, в том числе липидов, белков и нуклеиновых кислот. Краткосрочный оксидативный стресс может иметь место в тканях, поврежденных травмой, инфекцией, тепловым ударом, гипероксией, токсинами и чрезмерной физической нагрузкой. Повреждение тканей способствует увеличению количества ферментов, таких как ксантиноксидаза, липогеназа, циклооксигеназа, генерирующих свободные радикалы, а также приводит к активации фагоцитов, высвобождению свободного железа и ионов меди или к разрушению транспортных цепей электронов в процессе окислительного фосфорилирования из-за избыточной выработки активных форм кислорода (АФК). Образование, распространение и развитие рака, а также побочное действие лучевой и химиотерапии, связывают с дисбалансом между АФК и антиоксидантной защитной системой. Активные формы кислорода всегда вовлечены в развитие сахарного диабета, возрастных заболеваний глаз и нейродегенеративных заболеваний, таких как болезнь Паркинсона. V. Lobo et al., "Free Radicals, Antioxidants and Functional Foods: Impact on Human Health," Pharmacognosy Reviews 4, no. 8 (2010): 118.
- 19 B. T. Ashok and R. Ali, "The Aging Paradox: Free Radical Theory of Aging," Experimental Gerontology 34, no. 3 (1999): 293–303.
- 20 Многие трансгенные исследования указывают на то, что регуляция антиоксидантных ферментов в сторону уменьшения необязательно сокращает продолжительность жизни. Однако этот вывод носит спорный характер.
- 21 Из переписки по электронной почте с Д. Хэном, адъюнкт-профессором биофармацевтических наук Института последипломного образования Кека, от 22 января 2019 года.

- 22 Из переписки по электронной почте с Дж. Кингом, почетным профессором Калифорнийского университета в Беркли, от 21 января 2019 года.
- 23 U. Nurmatov, G. Devereux, and A. Sheikh, "Nutrients and Foods for the Primary Prevention of Asthma and Allergy: Systematic Review and Meta-Analysis," Journal of Allergy and Clinical Immunology 127, no. 3 (2011): 724–733.
- 24 A. M. Pisoschi and A. Pop, "The Role of Antioxidants in the Chemistry of Oxidative Stress: A Review," European Journal of Medicinal Chemistry 97 (2015): 55–74.
- 25 S. K. Myung et al., "Efficacy of Vitamin and Antioxidant Supplements in Prevention of Cardiovascular Disease: Systematic Review and Meta-Analysis of Randomised Controlled Trials," British Medical Journal 346 (2013): f10.
- 26 Pisoschi and Pop, "The Role of Antioxidants."
- 27 Из личного общения с Д. Хэном 25 февраля 2019 года.
- 28 M. Ristow et al., "Antioxidants Prevent Health-Promoting Effects of Physical Exercise in Humans," Proceedings of the National Academy of Sciences 106, no. 21 (2009): 8665–8670.
- 29 Mayo Clinic, "High Cholesterol," n.d., https://www.mayoclinic.org/diseases-conditions/high-blood-cholesterol/symptoms-causes/syc-20350800; US National Library of Medicine, "Cholesterol," n.d., https://medlineplus.gov/cholesterol.html.
- 30 R. Chou et al., "Statins for Prevention of Cardiovascular Disease in Adults: Evidence Report and Systematic Review for the US Preventive Services Task Force," Journal of the American Medical Association 316, no. 19 (2016): 2008–2024; A. Thompson and N. J. Temple, "The Case for Statins: Has It Really Been Made?," Journal of the Royal Society of Medicine 97, no. 10 (2004): 461–464.
- 31 Mayo Clinic Staff, "High Cholesterol."
- 32 R. Chowdhury et al., "Association of Dietary, Circulating, and Supplement Fatty Acids with Coronary Risk: A Systematic Review and Meta-Analysis," Annals of Internal Medicine 160, no. 6 (2014): 398–406.
- 33 Harvard Medical School Staff, "11 Foods That Lower Cholesterol," Harvard Health Publishing, https://www.health.harvard.edu/heart-health/11-foods-that-lower-cholesterol.
- 34 Chowdhury et al., "Association of Dietary, Circulating, and Supplement Fatty Acids."
- 35 A. Malhotra, R. F. Redberg, and P. Meier, "Saturated Fat Does Not Clog the Arteries: Coronary Heart Disease Is a Chronic Inflammatory Condition, the Risk of Which Can Be Effectively Reduced from Healthy Lifestyle Interventions," British Journal of Sports Medicine 51, no. 15 (2017): 1111–1112; M. M. Pinheiro and T. Wilson, "Dietary Fat: The Good, the Bad, and the Ugly," in Nutrition Guide for Physicians and Related Healthcare Professionals, ed. N. J. Temple, T. Wilson, and G. A. Bray, pp. 241–247 (Cham: Humana Press, 2017).
- 36 M. Mattson, "Why Fasting Bolsters Brain Power," TEDx Talks, March 18, 2014, https://www.youtube.com/watch? v= 4UkZAwKoCP8.
- 37 R. J. Colman et al., "Dietary Restriction Delays Disease Onset and Mortality in Rhesus Monkeys," Science 325 (2009): 201–204; W. Mair et al., "Demography of Dietary Restriction and Death in Drosophila," Science 301 (2003): 1731–1733.
- 38 C. Lee and V. Longo, "Dietary Restriction with and without Caloric Restriction for Healthy Aging," F1000Research 5 (2016).

- 39 C. Kenyon, "The Genetics of Ageing," Nature 464 (2010): 504-512.
- 40 N. M. Templeman et al., "A Causal Role for Hyperinsulinemia in Obesity," Journal of Endocrinology 232, no. 3 (2017): R173–R183.
- 41 R. Marín-Juez et al., "Hyperinsulinemia Induces Insulin Resistance and Immune Suppression via Ptpn6/Shp1 in Zebrafish," Journal of Endocrinology 222, no. 2 (2014): 229–241.
- 42 L. Drimba et al., "The Role of Acute Hyperinsulinemia in the Development of Cardiac Arrhythmias," Naunyn-Schmiedeberg's Archives of Pharmacology 386, no. 5 (2013): 435–444.
- 43 Mattson, "Why Fasting Bolsters Brain Power."
- 44 G. Bedse et al., "Aberrant Insulin Signaling in Alzheimer's Disease: Current Knowledge," Frontiers in Neuroscience 9 (2015): 204.
- 45 J. M. Campbell et al., "Metformin Use Associated with Reduced Risk of Dementia in Patients with Diabetes: A Systematic Review and Meta-Analysis," Journal of Alzheimer's Disease 65, no. 4 (2018): 1225–1236.
- 46 V. M. Walker et al., "Can Commonly Prescribed Drugs Be Repurposed for the Prevention or Treatment of Alzheimer's and Other Neurodegenerative Diseases? Protocol for an Observational Cohort Study in the UK Clinical Practice Research Datalink," BMJ Open 6, no. 12 (2016): e012044; см. также: А. Gupta, B. Bisht, and C. S. Dey, "Peripheral Insulin-Sensitizer Drug Metformin Ameliorates Neuronal Insulin Resistance and Alzheimer's-like Changes," Neuropharmacology 60, no. 6 (2011): 910–920.
- 47 Mattson, "Why Fasting Bolsters Brain Power."
- 48 F. R. Pérez-López et al., "Effects of the Mediterranean Diet on Longevity and Age-Related Morbid Conditions," Maturitas 64, no. 2 (2009): 67–79.
- 49 На момент написания этих строк в статье из «Википедии» о глюкозинолатах сказано, что не существует клинических доказательств эффективности их применения против рака. Конечно, статьи в «Википедии» могут меняться в любой момент и в целом их достоверность зависит от истинности точки зрения человека, который последним их редактировал. Этот вывод противоречит моему подходу к чтению литературы, а также подходу многих профессиональных ученых, которые проверяли эту книгу. Вот краткий список работ, которые поддерживают мое мнение:
  - G. Tse and G. D. Eslick, "Cruciferous Vegetables and Risk of Colorectal Neoplasms: A Systematic Review and Meta-Analysis," Nutrition and Cancer 66, no. 1 (2014): 128–139.
  - R. W.-L. Ma and K. Chapman, "A Systematic Review of the Effect of Diet in Prostate Cancer Prevention and Treatment," Journal of Human Nutrition and Dietetics 22, no. 3 (2009): 187–199.
  - M. Loef and H. Walach, "Fruit, Vegetables and Prevention of Cognitive Decline or Dementia: A Systematic Review of Cohort Studies," Journal of Nutrition, Health and Aging 16, no. 7 (2012): 626–630.
  - J. D. Potter and K. Steinmetz, "Vegetables, Fruit and Phytoestrogens as Preventive Agents," IARC Scientific Publications 139 (1996): 61–90.
  - H. Steinkellner et al., "Effects of Cruciferous Vegetables and Their Constituents

- on Drug Metabolizing Enzymes Involved in the Bioactivation of DNA-Reactive Dietary Carcinogens," Mutation Research/Fundamental and Molecular Mechanisms of Mutagenesis 480 (2001): 285–297.
- H. H. Nguyen et al., "The Dietary Phytochemical Indole-3-Carbinol Is a Natural Elastase Enzymatic Inhibitor That Disrupts Cyclin E Protein Processing," Proceedings of the National Academy of Sciences 105, no. 50 (2008): 19750–19755. F. Fuentes, X. Paredes-Gonzalez, and A. N. T. Kong, "Dietary Glucosinolates Sulforaphane, Phenethyl Isothiocyanate, Indole-3-Carbinol/3, 3´-Diindolylmethane: Antioxidative Stress/Inflammation, Nrf2, Epigenetics/Epigenomics and in Vivo Cancer Chemopreventive Efficacy," Current Pharmacology Reports 1, no. 3 (2015): 179–196.
- K. J. Royston and T. O. Tollefsbol, "The Epigenetic Impact of Cruciferous Vegetables on Cancer Prevention," Current Pharmacology Reports 1, no. 1 (2015): 46–51.
- 50 Grand View Research, "Omega 3 Supplement Market Analysis by Source (Fish Oil, Krill Oil), by Application (Infant Formula, Food and Beverages, Nutritional Supplements, Pharmaceutical, Animal Feed, Clinical Nutrition), and Segment Forecasts, 2018–2025," May 2017, https://www.grandviewresearch.com/industry-analysis/omega-3-supplement-market; Statista, "Global Omega-3 Supplement Market Size in 2016 and 2025 (in Billion US Dollars)," 2016, https://www.statista.com/statistics/758383/omega-3-supplement-market-size-worldwide/.
- 51 A. S. Abdelhamid et al., "Omega-3 Fatty Acids for the Primary and Secondary Prevention of Cardiovascular Disease," Cochrane Database of Systematic Reviews 11 (2018).
- 52 NIH National Center for Complementary and Integrative Health, "Omega-3 Supplements: In Depth," 2018, https://nccih.nih.gov/health/omega3/introduction. htm.
- 53 H. LeWine, "Fish Oil: Friend or Foe?," Harvard Health Publishing, 2019, https://www.health.harvard.edu/blog/fish-oil-friend-or-foe-201307126467.
- 54 S. E. Brien et al., "Effect of Alcohol Consumption on Biological Markers Associated with Risk of Coronary Heart Disease: Systematic Review and Meta-Analysis of Interventional Studies," British Medical Journal 342 (2011): d636.
- 55 A. Artero et al., "The Impact of Moderate Wine Consumption on Health," Maturitas 80, no. 1 (2015): 3–13.
- 56 World Cancer Research Fund and American Institute for Cancer Research, Food, Nutrition, Physical Activity, and the Prevention of Cancer: A Global Perspective, vol. 1 (Washington, DC: American Institute for Cancer Research, 2007).
- 57 L. Schwingshackl and G. Hoffmann, "Adherence to Mediterranean Diet and Risk of Cancer: An Updated Systematic Review and Meta-Analysis of Observational Studies," Cancer Medicine 4, no. 12 (2015): 1933–1947.
- 58 Pérez-López et al., "Effects of the Mediterranean Diet"; O. Vang et al., "What Is New for an Old Molecule? Systematic Review and Recommendations on the Use of Resveratrol," PLoS One 6, no. 6 (2011): e19881.

- 59 J. M. Smoliga, J. A. Baur, and H. A. Hausenblas, "Resveratrol and Health—a Comprehensive Review of Human Clinical Trials," Molecular Nutrition and Food Research 55, no. 8 (2011): 1129–1141.
- 60 D. G. Loughrey et al., "The Impact of the Mediterranean Diet on the Cognitive Functioning of Healthy Older Adults: A Systematic Review and Meta-Analysis," Advances in Nutrition 8, no. 4 (2017): 571–586.
- 61 O. van de Rest et al., "Dietary Patterns, Cognitive Decline, and Dementia: A Systematic Review," Advances in Nutrition 6, no. 2 (2015): 154–168.
- 62 J. Brody, "Muscle Loss in Aging Can Be Reversed," The New York Times, September 4, 2018, p. D5.
- 63 United States Department of Agriculture, Agricultural Research Service, USDA Food Composition Databases, n.d., https://ndb.nal.usda.gov/ndb/nutrients/index.
- 64 Brody, "Muscle Loss in Aging."
- 65 US National Library of Medicine, National Center for Biotechnology Information, PubChem Database, Leucine, CID 6106, 2019, https://pubchem.ncbi.nlm.nih.gov/compound/6106.
- 66 R. Elango et al., "Determination of the Tolerable Upper Intake Level of Leucine in Acute Dietary Studies in Young Men," American Journal of Clinical Nutrition 96, no. 4 (2012): 759–767; A. G. Wessels et al., "High Leucine Diets Stimulate Cerebral Branched-Chain Amino Acid Degradation and Modify Serotonin and Ketone Body Concentrations in a Pig Model," PLoS One 11, no. 3 (2016): e0150376; M. Yudkoff et al., "Brain Amino Acid Requirements and Toxicity: The Example of Leucine," Journal of Nutrition 135, no. 6 (2005): 1531S–1538S.
- 67 M. Messina, "Soy and Health Update: Evaluation of the Clinical and Epidemiologic Literature," Nutrients 8, no. 12 (2016): 754.
- 68 E. Dolhun, "Aftermath of Typhoon Haiyan: The Imminent Epidemic of Waterborne Illnesses in Leyte, Philippines," Disaster Medicine and Public Health Preparedness 7, no. 6 (2013): 547–548.
- 69 C. Troeger et al., "Estimates of the Global, Regional, and National Morbidity, Mortality, and Aetiologies of Diarrhoea in 195 Countries: A Systematic Analysis for the Global Burden of Disease Study 2016," Lancet Infectious Diseases 18, no. 11 (2018): 1211–1228; C. Trinh and K. Prabhakar, "Diarrheal Diseases in the Elderly," Clinics in Geriatric Medicine 23, no. 4 (2007): 833–856.
- 70 Из личного общения с доктором медицины Эдуардо Долхуном 21 февраля 2017 года.
- 71 D. R. Thomas et al., "Understanding Clinical Dehydration and Its Treatment," Journal of the American Medical Directors Association 9, no. 5 (2008): 292–301.
- 72 World Health Organization, "Diarrhoeal Disease," 2017, https://www.who.int/news-room/fact-sheets/detail/diarrhoeal-disease.
- 73 Из личного общения с Эдуардо Долхуном.
- 74 К сожалению, многие растворы ОРС неприятны на вкус, из-за чего люди, которым они необходимы, не хотят их пить. В некоторые такие продукты для улучшения вкуса добавлен рафинированный сахар, что дает обратный эффект. Я рекомендую раствор DripDrop, который разработал мой коллега врач Эдуардо Долхун. Он проходил подготовку в клинике Мауо и регулярно участвует

- в гуманитарных миссиях в развивающихся странах, где лечит обезвоживание с помощью своего продукта. У меня нет финансовой заинтересованности в деятельности этой компании, и я не извлеку никакой выгоды, если вы будете покупать этот продукт. Список рекомендаций можно посмотреть здесь: Eduardo P. Dolhun, Oral rehydration composition, US Patent 8,557,301, filed July 1, 2011, and issued October 15, 2013, https://patentimages.storage.googleapis.com/bd/54/5b/cd03de0b6f973c/US8557301.pdf.
- 75 D. Gandell et al., "Treatment of Constipation in Older People," CMAJ 185, no. 8 (2013): 663–670.
- 76 Y. Li et al., "Hippocampal Gene Expression Profiling in a Rat Model of Functional Constipation Reveals Abnormal Expression Genes Associated with Cognitive Function," Neuroscience Letters 675 (2018): 103–109.
- 77 Y. M. I. Kazem et al., "Constipation, Oxidative Stress in Obese Patients and Their Impact on Cognitive Functions and Mood, the Role of Diet Modification and Foeniculum vulgare Supplementation," Journal of Biological Sciences 17, no. 7 (2017): 312–319; R. T. Wang and Y. Li, "Analysis of Cognitive Function of Old People with Functional Constipation," Journal of Harbin Medical University 6 (2011): 603–605.
- 78 A. Low, "Treating Constipation with Laxatives," 2010, GI Society: Canadian Society of Intestinal Research, https://www.badgut.org/information-centre/a-z-digestive-topics/treating-constipation-with-laxatives/.
- 79 A. Evrensel and M. E. Ceylan, "The Gut-Brain Axis: The Missing Link in Depression," Clinical Psychopharmacology and Neuroscience 13, no. 3 (2015): 239; Y. E. Borre et al., "Microbiota and Neurodevelopmental Windows: Implications for Brain Disorders," Trends in Molecular Medicine 20, no. 9 (2014): 509–518.
- 80 C. Rousseaux et al., "Lactobacillus acidophilus Modulates Intestinal Pain and Induces Opioid and Cannabinoid Receptors," Nature Medicine 13, no. 1 (2007): 35.
- 81 M. Valles-Colomer et al., "The Neuroactive Potential of the Human Gut Microbiota in Quality of Life and Depression," Nature Microbiology 1 (2019).
- 82 T. G. Dinan and J. F. Cryan, "Melancholy Microbes: A Link between Gut Microbiota and Depression?," Neurogastroenterology and Motility, no. 25 (2013): 713–19.
- 83 Borre et al., "Microbiota and Neurodevelopmental Windows."
- 84 Evrensel and Ceylan, "The Gut-Brain Axis"; J. F. Cryan and T. G. Dinan, "Mind-Altering Microorganisms: The Impact of the Gut Microbiota on Brain and Behaviour," Nature Reviews Neuroscience 13, no. 10 (2012): 701.
- 85 Cryan and Dinan, "Mind-Altering Microorganisms"; E. G. Severance et al., "Discordant Patterns of Bacterial Translocation Markers and Implications for Innate Immune Imbalances in Schizophrenia," Schizophrenia Research 148, nos. 1–3 (2013): 130–137; A. I. Petra et al., "GutMicrobiota-Brain Axis and Its Effect on Neuropsychiatric Disorders with Suspected Immune Dysregulation," Clinical Therapeutics 37, no. 5 (2015): 984–995; F. Dickerson, E. Severance, and R. Yolken, "The Microbiome, Immunity, and Schizophrenia and Bipolar Disorder," Brain, Behavior, and Immunity 62 (2017): 46–52.
- 86 Borre et al., "Microbiota and Neurodevelopmental Windows."

- 87 M. Hoppe et al., "Probiotic Strain Lactobacillus plantarum 299v Increases Iron Absorption from an Iron-Supplemented Fruit Drink: A Double-Isotope Cross-Over Single-Blind Study in Women of Reproductive Age," British Journal of Nutrition 114, no. 8 (2015): 1195–1202.
- 88 M. Trinder et al., "Probiotic Lactobacilli: A Potential Prophylactic Treatment for Reducing Pesticide Absorption in Humans and Wildlife," Beneficial Microbes 6, no. 6 (2015): 841–847.
- 89 M. Zarrati et al., "Effects of Probiotic Yogurt on Fat Distribution and Gene Expression of Proinflammatory Factors in Peripheral Blood Mononuclear Cells in Overweight and Obese People with or without Weight-Loss Diet," Journal of the American College of Nutrition 33, no. 6 (2014): 417–425.
- 90 Y. Zhang et al., "Effects of Probiotic Type, Dose and Treatment Duration on Irritable Bowel Syndrome Diagnosed by Rome III Criteria: A Meta-analysis," BMC Gastroenterology 16, no. 1 (2016): 62.
- 91 M. Messaoudi et al., "Assessment of Psychotropic-like Properties of a Probiotic Formulation (Lactobacillus helveticus R0052 and Bifidobacterium longum R0175) in Rats and Human Subjects," British Journal of Nutrition 105, no. 5 (2011): 755–764.
- 92 Cryan and Dinan, "Mind-Altering Microorganisms."
- 93 Cryan and Dinan, "MindAltering Microorganisms"; T. Chen et al., "Role of the Anterior Insular Cortex in Integrative Causal Signaling during Multisensory Auditory-Visual Attention," European Journal of Neuroscience 41, no. 2 (2015): 264–274.
- 94 K. Tillisch et al., "Consumption of Fermented Milk Product with Probiotic Modulates Brain Activity," Gastroenterology 144, no. 7 (2013): 1394–1401.
- 95 A. Reynolds et al., "Carbohydrate Quality and Human Health: A Series of Systematic Reviews and Meta-Analyses," Lancet 393, no. 10170 (2019): 434–445.
- 96 M. J. Claesson et al., "Gut Microbiota Composition Correlates with Diet and Health in the Elderly," Nature 488, no. 7410 (2012): 178; Cryan and Dinan, "Mind-Altering Microorganisms."
- 97 Borre et al., "Microbiota and Neurodevelopmental Windows."
- 98 Claesson et al., "Gut Microbiota Composition Correlates with Diet and Health in the Elderly."
- 99 Harvard Medical School Staff, "Health Benefits of Taking Probiotics," Harvard Health Publishing, August 22, 2018, https://www.health.harvard.edu/vitamins-and-supplements/health-benefits-of-taking-probiotics.
- 100 C. C. Dodoo et al., "Use of a Water-Based Probiotic to Treat Common Gut Pathogens," International Journal of Pharmaceutics 556 (2019): 136–141; M. Fredua-Agyeman and S. Gaisford, "Comparative Survival of Commercial Probiotic Formulations: Tests in Biorelevant Gastric Fluids and RealTime Measurements using Microcalorimetry," Beneficial Microbes 6, no. 1 (2014): 141–151.
- 101 Y. Ringel, E. M. Quigley, and H. C. Lin, "Using Probiotics in Gastrointestinal Disorders," American Journal of Gastroenterology Supplements 1, no. 1 (2012): 34.

- 102 Prosauker Rose LLP, "\$15 Million False Ad Verdict Boosts Damages in Probiotic IP Dispute," Lexology, December 21, 2018, https://www.proskaueronadvertising.com/2018/12/15-million-false-ad-verdict-boosts-damages-in-probiotic-ip-dispute/.
- 103 E. Watson, "'Confusing' False Ad Lawsuit over KeVita Kombucha Reflects Split in Industry over Production Methods, Say Attorneys," Food Navigator USA, October 25, 2017, https://www.foodnavigator-usa.com/Article/2017/10/26/ Confusing-false-ad-lawsuit-over-KeVita-kombucha-reflects-split-in-industry-overproduction-methods-say-attorneys.
- 104 GI Society: Canadian Society of Intestinal Research, "Lawsuit Settled: Dannon Yogurt Didn't Measure Up to Its Claims," November 16, 2016, https://www.badgut.org/information-centre/a-z-digestive-topics/dannon-lawsuit-settled/. В 2017 году против GT's Kombucha выдвинули не упомянутый в тексте дополнительный коллективный иск на сумму 8,25 миллиона долларов. В ходе судебного разбирательства было установлено, что напиток бренда содержит до 2,5 процента алкоголя, как в слабоалкогольном пиве. В этом иске было также сказано, что напиток содержит больше указанных на этикетке 2 грамм сахара на одну порцию в 227 грамм. М. Caballero, "Judge Approves \$8.25 Million Settlement in GT's Kombucha and Whole Foods Suit," BevNet News, February 3, 2017, https://www.bevnet.com/news/2017/judge-approves-8-25-million-settlement-gts-kombucha-whole-foods-suit.
- 105 Два пробиотических препарата, эффективность которых подкреплена доказательствами, это Symprove, который можно купить на сайте https://www.symprove.com/, а также Visbiome, который продается на сайте https://www.visbiome.com/. У меня нет финансовой заинтересованности в деятельности этой компании, и я не извлеку никакой выгоды, если вы будете покупать эти продукты.
- 106 D. Charalampopoulos and R. A. Rastall, "Prebiotics in Foods," Current Opinion in Biotechnology 23, no. 2 (2012): 187–191.
- 107 B. M. Corcoran et al., "Survival of Probiotic Lactobacilli in Acidic Environments Is Enhanced in the Presence of Metabolizable Sugars," Applied and Environmental Microbiology 71, no. 6 (2005): 3060–3067.
- 108 M. Lyte et al., "Resistant Starch Alters the Microbiota-Gut Brain Axis: Implications for Dietary Modulation of Behavior," PLoS One 11, no. 1 (2016): e0146406; A. Gunenc, C. Alswiti, and F. Hosseinian, "Wheat Bran Dietary Fiber: Promising Source of Prebiotics with Antioxidant Potential," Journal of Food Research 6, no. 2 (2017): 1; F. M. N. A. Aida et al., "Mushroom as a Potential Source of Prebiotics: A Review," Trends in Food Science and Technology 20, nos. 11–12 (2009): 567–575; M. de Jesus Raposo, A. de Morais, and R. de Morais, "Emergent Sources of Prebiotics: Seaweeds and Microalgae," Marine Drugs 14, no. 2 (2016): 27.
- 109 G. J. Bakker and M. Nieuwdorp, "Fecal Microbiota Transplantation: Therapeutic Potential for a Multitude of Diseases beyond Clostridium difficile," Microbiology Spectrum 5, no. 4 (2017); J. F. Petrosino, "The Microbiome in Precision Medicine: The Way Forward," Genome Medicine 10, no. 1 (2018): 12.

- 110 S. Paramsothy et al., "Faecal Microbiota Transplantation for Inflammatory Bowel Disease: A Systematic Review and MetaAnalysis," Journal of Crohn's and Colitis 11, no. 10 (2017): 1180–1199.
- 111 H. Eyre et al., "Preventing Cancer, Cardiovascular Disease, and Diabetes: A Common Agenda for the American Cancer Society, the American Diabetes Association, and the American Heart Association," Circulation 109, no. 25 (2004): 3244–3255.
- 112 A. O'Connor, "The Hunt for an Optimal Diet," The New York Times, December 25, 2018, D4; H. Pontzer, B. M. Wood, and D. A. Raichlen, "Hunter-Gatherers as Models in Public Health," Obesity Reviews 19 (2018): 24–35.
- 113 K. Hall et al., "Ultra-Processed Diets Cause Excess Calorie Intake and Weight Gain: An Independent Randomized Controlled Trial of Ad Libitum Food Intake," Cell Metabolism 30 (2019): 67–77.
- 114 N. Van Dyke and E. J. Drinkwater, "Relationships between Intuitive Eating and Health Indicators: Literature Review," Public Health Nutrition 17, no. 8 (2014): 1757–1766.
- 115 M. Frayn, "Doing Away with Diets Once and for All," Eat North, January 9, 2019, https://eatnorth.com/mallory-frayn/doing-away-diets-once-and-all.
- 116 K. Buchanan and J. Sheffield, "Why Do Diets Fail? An Exploration of Dieters' Experiences Using Thematic Analysis," Journal of Health Psychology 22, no. 7 (2017): 906–915.
- 117 Van Dyke and Drinkwater, "Relationships between Intuitive Eating."
- 118 M. Frayn and B. Knäuper, "Emotional Eating and Weight in Adults: A Review," Current Psychology 37, no. 4 (2018): 924–933.
- 119 N. Johnson, "Food Confusion," Stanford Magazine, July-August 2013, https://stanfordmag.org/contents/food-confusion.

- 1 Из общения со Скоттом Графтоном по электронной почте 21 декабря 2018 года.
- 2 Я уже писал об этом в книге: D. J. Levitin, The Organized Mind (New York: Dutton, 2014) (Левитин Д. Организованный ум. Как мыслить и принимать решения в эпоху информационной перегрузки. М.: Манн, Иванов и Фербер, 2019). См. также: D. C. Dennett, "The Cultural Evolution of Words and Other Thinking Tools," in Evolution: The Molecular Landscape, ed. B. Stillman, D. Stewart, and J. Witkowski, Cold Spring Harbor Symposia on Quantitative Biology, vol. 74, pp. 435–441 (Cold Spring Harbor, NY: Cold Spring Harbor Laboratory Press, 2009); and P. MacCready, "An Ambivalent Luddite at a Technological Feast," Designfax, August 1999, http://maccready.library.caltech.edu/islandora/object/pbm% 3A27832#page/1/mode/2up.
- 3 P. D. Loprinzi, M. K. Edwards, and E. Frith, "Potential Avenues for Exercise to Activate Episodic Memory-Related Pathways: A Narrative Review," European Journal of Neuroscience 46, no. 5 (2017): 2067–2077.
- 4 A. Setti and A. M. Borghi, "Embodied Cognition over the Lifespan: Theoretical Issues and Implications for Applied Settings," Frontiers in Psychology 9 (2018): 550.

Скотт Графтон рекомендует: «Нам необходимо внимательно и недвусмысленно определить, что мы подразумеваем под воплощенным познанием. Некоторые психологи используют его как экспланандум космического единения с чувственным восприятием, как в случае Джеймса Джерома Гибсона. Этот термин возник под влиянием идей специалиста по робототехнике Родни Брукса, который утверждал, что с инженерной точки зрения было бы глупо размещать все элементы управления системы восприятия и реагирования в центральном процессоре. Для того чтобы освободить центральный блок управления, например мозг, какие-то операции должны выполняться на периферии. Еще один наглядный пример с нервными волокнами — рефлекс Шеррингтона (коленный рефлекс), который затрагивает только спинной мозг. Каждый из таких многоуровневых циклов расширяет функциональность. Два первые вообще не нуждаются в коре головного мозга. Иначе говоря, согласно теории воплощенного познания, определенные функции интеллектуальной обработки данных и управления выполняет тело. Из общения со Скоттом Графтоном по электронной почте.

- 5 Из личного общения с Д. Кракауэром 19 июля 2019 года.
- 6 A. Linson et al., "The Active Inference Approach to Ecological Perception: General Information Dynamics for Natural and Artificial Embodied Cognition," Frontiers in Robotics and AI 5 (2018): 21.
- 7 C. R. Madan and A. Singhal, "Using Actions to Enhance Memory: Effects of Enactment, Gestures, and Exercise on Human Memory," Frontiers in Psychology 3 (2012): 507.
- 8 P. D. Loprinzi et al., "Experimental Effects of Exercise on Memory Function among Mild Cognitive Impairment: Systematic Review and Meta-Analysis," Physician and Sportsmedicine (2018): 1–6.
- 9 Loprinzi et al., "Experimental Effects."
- 10 S. F. Tsai et al., "Exercise Counteracts Aging-Related Memory Impairment: A Potential Role for the Astrocytic Metabolic Shuttle," Frontiers in Aging Neuroscience 8 (2016): 57. 284 onset of walking triggers neurochemical activity: A. M. Glenberg and J. Hayes, "Contribution of Embodiment to Solving the Riddle of Infantile Amnesia," Frontiers in Psychology 7 (2016): 10.
- 11 M. C. Costello and E. K. Bloesch, "Are Older Adults Less Embodied? A Review of Age Effects through the Lens of Embodied Cognition," Frontiers in Psychology 8 (2017): 267.
- 12 B. Hommel and A. Kibele, "Down with Retirement: Implications of Embodied Cognition for Healthy Aging," Frontiers in Psychology 7 (2016): 1184.
- 13 Hommel and Kibele, "Down with Retirement."
- 14 L. Valenti, "At 75, Mick Jagger Shares His Incredible Post-Heart Surgery Dance Moves," Vogue, May 15, 2019, https://www.vogue.com/article/mick-jagger-post-heart-surgery-dance-workout-moves-fitness.
- 15 J. Sitzes, "How Jane Fonda Looks So Young at 80," Prevention, May 18, 2018, https://www.prevention.com/fitness/a20686775/jane-fonda-age.

- 16 C. Y. Kuo and Y. Y. Yeh, "Sensorimotor-Conceptual Integration in Free Walking Enhances Divergent Thinking for Young and Older Adults," Frontiers in Psychology 7 (2016): 1580.
- 17 Tsai et al., "Exercise Counteracts Aging-Related Memory Impairment."
- 18 S. M. Ryan and Y. M. Nolan, "Neuroinflammation Negatively Affects Adult Hippocampal Neurogenesis and Cognition: Can Exercise Compensate?," Neuroscience and Biobehavioral Reviews 61 (2016): 121–131.
- 19 Ryan and Nolan, "Neuroinflammation Negatively Affects."
- 20 Ryan and Nolan, "Neuroinflammation Negatively Affects."
- 21 A. Shimamura, Get SMART! Five Steps toward a Healthy Brain (Scotts Valley, CA: CreateSpace, 2017).
- 22 American College of Sports Medicine, ACSM's Guidelines for Exercise Testing and Prescription (Philadelphia: Lippincott Williams and Wilkins, 2013).
- 23 H. Patel et al., "Aerobic vs Anaerobic Exercise Training Effects on the Cardiovascular System," World Journal of Cardiology 9, no. 2 (2017): 134.
- 24 J. Brody, "Muscle Loss in Aging Can Be Reversed," The New York Times, September 4, 2018, p. D5.
- 25 W. R. Frontera et al., "Strength Conditioning in Older Men: Skeletal Muscle Hypertrophy and Improved Function," Journal of Applied Physiology 64, no. 3 (1988): 1038–1044.
- 26 M. A. Fiatarone et al., "High-Intensity Strength Training in Nonagenarians: Effects on Skeletal Muscle," Journal of the American Medical Association 263, no. 22 (1990): 3029–3034.
- 27 S. J. Colcombe et al., "Aerobic Exercise Training Increases Brain Volume in Aging Humans," Journals of Gerontology Series A: Biological Sciences and Medical Sciences 61, no. 11 (2006): 1166–1170.
- 28 Cardiac Exercise Research Group, "7 Week Fitness Program," https://www.ntnu.edu/cerg/regimen.
- 29 J. M. Letnes et al., "Peak Oxygen Uptake and Incident Coronary Heart Disease in a Healthy Population: The HUNT Fitness Study," European Heart Journal (2018).
- 30 "Making 2019 Happier," The Week, January 11, 2019, p. 16.
- 31 J. S. Thum et al., "High-Intensity Interval Training Elicits Higher Enjoyment Than Moderate Intensity Continuous Exercise," PLoS One 12, no. 1 (2017): e0166299.
- 32 L. M. Valenti et al., "Effect of Sexual Intercourse on Lower Extremity Muscle Force in Strength-Trained Men," Journal of Sexual Medicine 15, no. 6 (2018): 888–893.
- 33 World Fitness Level, "How Fit Are You, Really?," https://www.worldfitnesslevel. org/#/.
- 34 K. Suwabe et al., "Rapid Stimulation of Human Dentate Gyrus Function with Acute Mild Exercise," Proceedings of the National Academy of Sciences 115, no. 41 (2018): 10487–10492; A. Wahid et al., "Quantifying the Association between Physical Activity and Cardiovascular Disease and Diabetes: A Systematic Review and Meta-Analysis," Journal of the American Heart Association 5, no. 9 (2016):

- e002495; см. также: P. Siddarth et al., "Sedentary Behavior Associated with Reduced Medial Temporal Lobe Thickness in Middle-Aged and Older Adults," PLoS One 13, no. 4 (2018): e0195549.
- 35 Suwabe et al., "Rapid Stimulation."
- 36 S. B. Chapman et al., "Shorter Term Aerobic Exercise Improves Brain, Cognition, and Cardiovascular Fitness in Aging," Frontiers in Aging Neuroscience 5 (2013): 75.
- 37 S. Scutti, "'Pandemic' of Inactivity Increases Disease Risk Worldwide, WHO Study Says," CNN, September 5, 2018, https://www.cnn.com/2018/09/04/health/exercise-physical-activity-who-study/index.html.
- 38 R. A. Friedman, "Standing Can Make You Smarter," The New York Times, April 19, 2018, p. A31.
- 39 S. Carrell, "Scottish GPs to Begin Prescribing Rambling and Birdwatching," The Guardian, October 4, 2018, https://www.theguardian.com/uk-news/2018/oct/05/scottish-gps-nhs-begin-prescribing-rambling-birdwatching.
- 40 J. Housman, "Scottish Doctors Are Now Issuing Prescriptions to Go Hiking," Adventure Journal, October 22, 2018, https://www.adventure-journal.com/2018/10/scottish-doctors-are-now-issuing-prescriptions-to-go-hiking/.

- 1 M. Lazarus et al., "Adenosine and Sleep," in Handbook of Experimental Pharmacology, J. Barrett, ed. (Berlin: Springer, 2017).
- 2 P. Doyle, "The Last Word: Billy Joel on Self-Doubt, Trump and Finally Becoming Cool," Rolling Stone, June 14, 2017.
- 3 D. Kamp, "Nighty Night," The New York Times Sunday Book Review, October 15, 2017, p. BR16.
- 4 R. Friedel and P. Israel, Edison's Electric Light: The Art of Invention, rev. ed. (Baltimore, MD: Johns Hopkins University Press, 2010), pp. 29–31.
- 5 M. Walker, Why We Sleep: Unlocking the Power of Sleep and Dreams (New York: Scribner, 2017). (*Уолкер М.* Зачем мы спим. Новая наука о сне и сновидениях. М.: КоЛибри, 2020.) Строка, в которой представлено краткое содержание книги, взята из следующего источника: Kamp, "Nighty Night."
- 6 R. Cooke, "'Sleep Should Be Prescribed': What Those Late Nights Out Could Be Costing You," The Guardian, September 24, 2017.
- 7 Walker, Why We Sleep.
- 8 Cooke, "'Sleep Should Be Prescribed.'"
- 9 Ovid, Metamorphoseon libri (Metamorphoses) (AD 8). (Овидий. Метаморфозы. Книга 11. Перевод С. Шервинского).
- 10 S. S. Yoo et al., "The Human Emotional Brain without Sleep— a Prefrontal Amygdala Disconnect," Current Biology 17, no. 20 (2007): R877–R878.
- 11 L. Xie et al., "Sleep Drives Metabolite Clearance from the Adult Brain," Science 342, no. 6156 (2013): 373–377.
- 12 J. Fang et al., "Association of Sleep Duration and Hypertension among US Adults Varies by Age and Sex," American Journal of Hypertension 25, no. 3 (2012): 335–341.

- 13 D. J. Gottlieb et al., "Association of Sleep Time with Diabetes Mellitus and Impaired Glucose Tolerance," Archives of Internal Medicine 165, no. 8 (2005): 863–867.
- 14 A. J. Clark et al., "Impaired Sleep and Allostatic Load: Cross-Sectional Results from the Danish Copenhagen Aging and Midlife Biobank," Sleep Medicine 15, no. 12 (2014): 1571–1578; R. P. Juster and B. S. McEwen, "Sleep and Chronic Stress: New Directions for Allostatic Load Research," Sleep Medicine 16, no. 1 (2015): 7–8.
- 15 E. Shokri-Kojori et al., "β-Amyloid Accumulation in the Human Brain after One Night of Sleep Deprivation," Proceedings of the National Academy of Sciences 115, no. 17 (2018): 4483–4488.
- 16 E. van Der Helm and M. P. Walker, "Overnight Therapy? The Role of Sleep in Emotional Brain Processing," Psychological Bulletin 135, no. 5 (2009): 731.
- 17 C. Dickens, Night Walks (New York: Penguin Classics, 1860). (Диккенс Ч. Собрание сочинений в тридцати томах. Том 26. М.: «Художественная литература», 1962.)
- 18 C. M. Paradis, L. A. Siegel, and S. B. Kleinman, "Two Cases of Zolpidem-Associated Homicide," Primary Care Companion for CNS Disorders 14, no. 4 (2012).
- 19 Cooke, "'Sleep Should Be Prescribed.'"
- 20 Этот абзац взят из книги: D. J. Levitin, The Organized Mind: Thinking Straight in the Age of Information Overload (New York: Dutton, 2014). (Левитин Д. Организованный ум. Как мыслить и принимать решения в эпоху информационной перегрузки. М.: Манн, Иванов и Фербер, 2019); М. Sarter and J. P. Bruno, "Cortical Cholinergic Inputs Mediating Arousal, Attentional Processing and Dreaming: Differential Afferent Regulation of the Basal Forebrain by Telencephalic and Brainstem Afferents," Neuroscience 95, no. 4 (1999): 933–952.
- 21 X. De Jaeger et al., "Decreased Acetylcholine Release Delays the Consolidation of Object Recognition Memory," Behavioural Brain Research 238 (2013): 62–68; J. Micheau and A. Marighetto, "Acetylcholine and Memory: A Long, Complex and Chaotic but Still Living Relationship," Behavioural Brain Research 221, no. 2 (2011): 424–429; E. J. Wamsley et al., "Dreaming of a Learning Task Is Associated with Enhanced Sleep-Dependent Memory Consolidation," Current Biology 20, no. 9 (2010): 850–855.
- 22 S. Drechsler et al., "With Mouse Age Comes Wisdom: A Review and Suggestions of Relevant Mouse Models for Age-Related Conditions," Mechanisms of Ageing and Development 160 (2016): 54–68.
- 23 S. Farajnia et al., "Aging of the Suprachiasmatic Clock," Neuroscientist 20, no. 1 (2014): 44–55.
- 24 Drechsler et al., "With Mouse Age Comes Wisdom."
- 25 M. A. Lluch, T. Lloret, and P. V. Llorca, "Aging and Sleep, and Vice Versa," Approaches to Aging Control 16 (2012): 17–21.
- 26 См., например: A. Naska et al., "Siesta in Healthy Adults and Coronary Mortality in the General Population," Archives of Internal Medicine 167, no. 3 (2007): 296–301.
- 27 Walker, Why We Sleep.

- 28 L. Barateau et al., "Hypersomnolence, Hypersomnia, and Mood Disorders," Current Psychiatry Reports 19, no. 2 (2017): 13.
- 29 Barateau et al., "Hypersomnolence."
- 30 K. Gleason and W. V. McCall, "Current Concepts in the Diagnosis and Treatment of Sleep Disorders in the Elderly," Current Psychiatry Reports 17, no. 6 (2015): 45.
- 31 N. E. Avis et al., "Duration of Menopausal Vasomotor Symptoms over the Menopause Transition," JAMA Internal Medicine 175, no. 4 (2015): 531–539.
- 32 M. Bruyneel, "Sleep Disturbances in Menopausal Women: Aetiology and Practical Aspects," Maturitas 81, no. 3 (2015): 406–409; L. Lampio et al., "Predictors of Sleep Disturbance in Menopausal Transition," Maturitas 94 (2016): 137–142.
- 33 D. Cintron et al., "Efficacy of Menopausal Hormone Therapy on Sleep Quality: Systematic Review and Meta-Analysis," Endocrine 55, no. 3 (2017): 702–711.
- 34 Из общения по электронной почте с Соней Люпьен 5 декабря 2018 года.
- 35 Writing Group for the Women's Health Initiative Investigators, "Risks and Benefits of Estrogen plus Progestin in Healthy Postmenopausal Women: Principal Results from the Women's Health Initiative Randomized Controlled Trial," Journal of the American Medical Association 288, no. 3 (2002): 321–333.
- 36 R. A. Lobo, "Where Are We 10 Years after the Women's Health Initiative?," Journal of Clinical Endocrinology and Metabolism 98, no. 5 (2013): 1771–1780.
- 37 A. Vermeulen, "Andropause," Maturitas 34, no. 1 (2000): 5–15; A. M. Matsumoto, "Andropause: Clinical Implications of the Decline in Serum Testosterone Levels with Aging in Men," Journals of Gerontology Series A: Biological Sciences and Medical Sciences 57, no. 2 (2002): M76–M99.
- 38 Vermeulen, "Andropause."
- 39 H. B. Carter, S. Piantadosi, and J. T. Isaacs, "Clinical Evidence for and Implications of the Multistep Development of Prostate Cancer," Journal of Urology 143, no. 4 (1990): 742–746.
- 40 A. Yang, A. A. Palmer, and H. De Wit, "Genetics of Caffeine Consumption and Responses to Caffeine," Psychopharmacology 211, no. 3 (2010): 245–257.
- 41 T. Roehrs and T. Roth, "Caffeine: Sleep and Daytime Sleepiness," Sleep Medicine Reviews 12, no. 2 (2008): 153–162.
- 42 E. Murillo-Rodriguez et al., "Anandamide Enhances Extracellular Levels of Adenosine and Induces Sleep: An In Vivo Microdialysis Study," Sleep 26, no. 8 (2003): 943–947.
- 43 I. Clark and H. P. Landolt, "Coffee, Caffeine, and Sleep: A Systematic Review of Epidemiological Studies and Randomized Controlled Trials," Sleep Medicine Reviews 31 (2017): 70–78.
- 44 L. Shilo et al., "The Effects of Coffee Consumption on Sleep and Melatonin Secretion," Sleep Medicine 3, no. 3 (2002): 271–273.
- 45 Roehrs and Roth, "Caffeine."
- 46 H. P. Landolt, "Caffeine, the Circadian Clock, and Sleep," Science 349, no. 6254 (2015): 1289–1289.
- 47 J. Snel and M. M. Lorist, "Effects of Caffeine on Sleep and Cognition," in Human Sleep and Cognition Part II: Clinical and Applied Research, Progress in Brain

- Research, vol. 190, ed. H. P. A. Van Dongen and G. A., Kerkhof, pp. 105–117 (Amsterdam: Elsevier, 2011).
- 48 T. Jiang et al., "Protective Effects of Melatonin on Retinal Inflammation and Oxidative Stress in Experimental Diabetic Retinopathy," Oxidative Medicine and Cellular Longevity (2016).
- 49 F. Yang et al., "Melatonin Protects Bone Marrow Mesenchymal Stem Cells against Iron Overload–Induced Aberrant Differentiation and Senescence," Journal of Pineal Research 63, no. 3 (2017): e12422.
- 50 Z. Xin et al., "Melatonin as a Treatment for Gastrointestinal Cancer: A Review," Journal of Pineal Research 58, no. 4 (2015): 375–387.
- 51 N. T. de Talamoni et al., "Melatonin, Gastrointestinal Protection, and Oxidative Stress," in Gastrointestinal Tissue, ed. J. Gracia-Sancho and J. Salvadó, pp. 317–325 (Cambridge, MA: Academic Press, 2017).
- 52 V. Martinez et al., "Tolerance to Stress Combination in Tomato Plants: New Insights in the Protective Role of Melatonin," Molecules 23, no. 3 (2018): 535.
- 53 T. I. Morgenthaler et al., "Practice Parameters for the Clinical Evaluation and Treatment of Circadian Rhythm Sleep Disorders," Sleep 30, no. 11 (2007): 1445–1459.
- 54 Hopkins Medicine Staff, "Melatonin for Sleep: Does It Work?," n.d., https://www.hopkinsmedicine.org/health/healthy-sleep/sleep-science/melatonin-for-sleep-does-it-work.
- 55 G. Chechile, "Melatonin and Cancer," Approaches to Aging Control 17 (2012): 33–47.
- 56 Chechile, "Melatonin and Cancer."
- 57 M. K. Scullin et al., "The Effects of Bedtime Writing on Difficulty Falling Asleep: A Polysomnographic Study Comparing To-Do Lists and Completed Activity Lists," Journal of Experimental Psychology: General 147, no. 1 (2018): 139.

- 1 Не так давно были предприняты попытки оспорить утверждения о том, что самая большая продолжительность жизни составляет 122 года. На мой взгляд, это не меняет понимания продолжительности жизни человека. Есть и другие люди, прожившие почти столько же лет, например 119-летняя Сара Кнаусс. См.: N. Zak, "Evidence That Jeanne Calment Died in 1934— Not 1997," Rejuvenation Research 22, no. 1 (2019): 3–12; J. Daly, "Was the World's Oldest Person Ever Actually Her 99-Year-Old Daughter?," Smithsonian, January 2, 2019, https://www.smithsonianmag.com/smart-news/study-questions-age-worlds-oldest-woman-180971153/.
- 2 G. Quirós, "These Flatworms Can Regrow a Body from a Fragment. How Do They Do It and Could We?," Shots— Health News from NPR, November 6, 2018, https://www.npr.org/sections/health-shots/2018/11/06/663612981/these-flatworms-can-regrow-a-body-from-a-fragment-how-do-they-do-it-and-could-we.
- 3 A. R. Gehrke et al., "Acoel Genome Reveals the Regulatory Landscape of Whole-Body Regeneration," Science 363, no. 6432 (2019): eaau6173.

- 4 T. Shomrat and M. Levin, "An Automated Training Paradigm Reveals Long-Term Memory in Planarians and Its Persistence through Head Regeneration," Journal of Experimental Biology 216, no. 20 (2013): 3799–3810. Работа Шомрата и Левина основана на более ранней работе: K. Agata and Y. Umesono: "Brain Regeneration from Pluripotent Stem Cells in Planarian," Philosophical Transactions of the Royal Society B: Biological Sciences 363, no. 1500 (2008): 2071–2078, and others.
- 5 W. C. Hahn et al., "Inhibition of Telomerase Limits the Growth of Human Cancer Cells," Nature Medicine 5, no. 10 (1999): 1164.
- 6 S. J. McInnes and P. J. A. Pugh, "Tardigrade Biogeography," in Water Bears: The Biology of Tardigrades, ed. R. O. Schill, pp. 115–129 (Cham, Switzerland: Springer, 2018).
- 7 T. C. Boothby et al., "Tardigrades Use Intrinsically Disordered Proteins to Survive Desiccation," Molecular Cell 65, no. 6 (2017): 975–984; Boothby made an educational video about the tardigrade: R. Cans, director, "Meet the Tardigrade, the Toughest Animal on Earth," TEDEd, March 21, 2017, http://ed.ted.com/lessons/meet-the-tardigrade-the-toughest-animal-on-earth-thomas-boothby.
- 8 X. Dong, B. Milholland, and J. Vijg, "Evidence for a Limit to Human Lifespan," Nature 538, no. 7624 (2016): 257.
- 9 Цит. по: R. Mandelbaum, "Scientists Push Back against Controversial Paper Claiming a Limit to Human Lifespans," Gizmodo, June 28, 2017, https://gizmodo.com/scientists-push-back-against-controversial-paper-claimi-1796483675.
- 10 Wikipedia, s.v. "Mile Run World Record Progression," updated July 13, 2019, https://en.wikipedia.org/wiki/Mile\_run\_world\_record\_progression#cite\_note-iaaf-5.
- 11 B. G. Hughes, and S. Hekimi, "Many Possible Lifespan Trajectories," Nature 546, no. 7660 (2017): E8.
- 12 Цит. по: S. Kirkey, "Forever Young: No Detectable Limit to Human Lifespan, McGill Biologists Say," The National Post, June 28, 2017, https://nationalpost.com/news/canada/no-detectable-limit-to-human-lifespan.
- 13 Из личного общения с Джеем Ольшанским 21 марта 2019 года.
- 14 E. Barbi et al., "The Plateau of HumanMortality: Demography of Longevity Pioneers," Science 360, no. 6396 (2018): 1459–1461.
- 15 C. Zimmer, "What Is the Limit of Our Life Span?," The New York Times, July 3, 2018, p. D3.
- 16 M. P. Rozing, T. B. Kirkwood, and R. G. Westendorp, "Is There Evidence for a Limit to Human Lifespan?," Nature 546, no. 7660 (2017): E11.
- 17 D. Buettner and S. Skemp, "Blue Zones: Lessons from the World's Longest Lived," American Journal of Lifestyle Medicine 10, no. 5 (2016): 318–321 (Бюттиер Д. Голубые зоны. 9 правил долголетия от людей, которые живут дольше всех. М.: Манн, Иванов и Фербер, 2015); М. Poulain, А. Herm, and G. Pes, "The Blue Zones: Areas of Exceptional Longevity around the World," Vienna Yearbook of Population Research 11, no. 1 (2013): 87.
- 18 J. G. Ruby et al., "Estimates of the Heritability of Human Longevity Are Substantially Inflated Due to Assortative Mating," Genetics 210, no. 3 (2018): 1109–1124.

- 19 M. Molteni, "The Key to Long Life Has Little to Do with 'Good Genes,' "Wired, November 6, 2018.
- 20 S. Ryu et al., "Genetic Landscape of APOE in Human Longevity Revealed by High-Throughput Sequencing," Mechanisms of Ageing and Development 155 (2016): 7–9.
- 21 R. Martins, G. J. Lithgow, and W. Link, "Long Live FOXO: Unraveling the Role of FOXO Proteins in Aging and Longevity," Aging Cell 15, no. 2 (2016): 196–207.
- 22 Кеньон сделала это не прямо, а посредством манипуляций с передачей инсулиноподобных сигналов перед геном FOXO.
- 23 C. Kenyon, "Experiments That Hint of Longer Lives," TEDGlobal, November 17, 2011, https://www.ted.com/talks/cynthia\_kenyon\_experiments\_that\_hint\_of\_longer\_lives/transcript#t-157928.
- 24 Из личного общения с Синтией Кеньон 28 февраля 2016 года.
- 25 H. Hsin and C. Kenyon, "Signals from the Reproductive System Regulate the Lifespan of C. elegans," Nature 399, no. 6734 (1999): 362.
- 26 J. B. Hamilton and G. E. Mestler, "Mortality and Survival: Comparison of Eunuchs with Intact Men and Women in a Mentally Retarded Population," Journal of Gerontology 24, no. 4 (1969): 395–411.
- 27 M. Gámez-del-Estal et al., "Epigenetic Effect of Testosterone in the Behavior of C. elegans. A Clue to Explain AndrogenDependent Autistic Traits?," Frontiers in Cellular Neuroscience 8 (2014): 69.
- 28 K. A. Bohnert and C. Kenyon, "A Lysosomal Switch Triggers Proteostasis Renewal in the Immortal C. elegans Germ Lineage," Nature 551, no. 7682 (2017): 629; C. Zimmer, "Young Again: How Mating Turns Back Time," The New York Times, November 22, 2017, p. D3.
- 29 C. Kenyon, "The Genetics of Ageing," Nature (2010): 464, 504–512.
- 30 L. Hayflick, "Human Cells and Aging," Scientific American 218, no. 3 (1968): 32–37.
- 31 J. Cepelewicz, "Ingenious: Leonard Hayflick," Nautilus, November 24, 2016, http://nautil.us/issue/42/fakes/ingenious-leonard-hayflick.
- 32 Российский биолог Алексей Оловников придумал аналогию с поездом метро и тоннелем, но мне так и не удалось понять его логику и представить себе, о чем он говорит. А. М. Olovnikov, "Telomeres, Telomerase, and Aging: Origin of the Theory," Experimental Gerontology 31, no. 4 (1996): 443–448.
- 33 M. Armanios and E. H. Blackburn, "The Telomere Syndromes," Nature Reviews Genetics 13, no. 10 (2012): 693.
- 34 G. W. Edmonds, H. C. Côté, and S. E. Hampson, "Childhood Conscientiousness and Leukocyte Telomere Length 40 Years Later in Adult Women—Preliminary Findings of a Prospective Association," PLoS One 10, no. 7 (2015): e0134077.
- 35 N. C. Arsenis et al., "Physical Activity and Telomere Length: Impact of Aging and Potential Mechanisms of Action," Oncotarget 8, no. 27 (2017): 45008; E. Puterman et al., "The Power of Exercise: Buffering the Effect of Chronic Stress on Telomere Length," PLoS One 5, no. 5 (2010): e10837; J. H. Kim et al., "Habitual Physical Exercise Has Beneficial Effects on Telomere Length in Postmenopausal Women," Menopause 19, no. 10 (2012): 1109–1115.

- 36 J. Y. Lee et al., "Association between Dietary Patterns in the Remote Past and Telomere Length," European Journal of Clinical Nutrition 69, no. 9 (2015): 1048; N. Rafie et al., "Dietary Patterns, Food Groups and Telomere Length: A Systematic Review of Current Studies," European Journal of Clinical Nutrition 71, no. 2 (2017): 151; A. M. Fretts et al., "Processed Meat, but Not Unprocessed Red Meat, Is Inversely Associated with Leukocyte Telomere Length in the Strong Heart Family Study," Journal of Nutrition 146, no. 10 (2016): 2013–2018.
- 37 S. Y. Gebreab et al., "Perceived Neighborhood Problems Are Associated with Shorter Telomere Length in African American Women," Psychoneuroendocrinology 69 (2016): 90–97; B. L. Needham et al., "Neighborhood Characteristics and Leukocyte Telomere Length: The MultiEthnic Study of Atherosclerosis," Health and Place 28 (2014): 167–172.
- 38 T. G. Son, S. Camandola, and M. P. Mattson, "Hormetic Dietary Phytochemicals," Neuromolecular Medicine 10, no. 4 (2008): 236.
- 39 E. Blackburn and E. Epel, The Telomere Effect: A Revolutionary Approach to Living Younger, Healthier, Longer (New York: Hachette, 2017). (Эпель Э., Блэкберн Э. Эффект теломер. Революционный подход к более молодой, здоровой и долгой жизни. М.: Эксмо, 2017.)
- 40 Blackburn and Epel, The Telomere Effect.
- 41 N. S. Schutte and J. M. Malouff, "A Meta-Analytic Review of the Effects of Mindfulness Meditation on Telomerase Activity," Psychoneuroendocrinology 42 (2014): 45–48; M. Alda et al., "Zen Meditation, Length of Telomeres, and the Role of Experiential Avoidance and Compassion," Mindfulness 7, no. 3 (2016): 651–659; E. A. Hoge et al., "Loving-Kindness Meditation Practice Associated with Longer Telomeres in Women," Brain, Behavior, and Immunity 32 (2013): 159–163.
- 42 J. Mogil, "What's Wrong with Animal Models of Pain?," The Opioid Crisis and the Future of Addiction and Pain Therapeutics: Opportunities, Tools, and Technologies Symposium, Washington, DC, February 2019, video, at 30:35: https://videocast.nih.gov/summary.asp?Live=31408&bhcp=1.
- 43 University of Pittsburgh Schools of the Health Sciences, "Telomere Length Predicts Cancer Risk," ScienceDaily, April 3, 2017, www.sciencedaily.com/releases/2017/04/170403083123.htm; J. M. Yuan et al., "A Prospective Assessment for Telomere Length in Relation to Risk of Cancer in the Singapore Chinese Health Study," AACR Annual Meeting, Washington, DC, April 2017.
- 44 F. P. Barthel et al., "Systematic Analysis of Telomere Length and Somatic Alterations in 31 Cancer Types," Nature Genetics 49, no. 3 (2017): 349. См. также: Р. С. Haycock et al., "Association between Telomere Length and Risk of Cancer and Non-Neoplastic Diseases: A Mendelian Randomization Study," JAMA Oncology 3, no. 5 (2017): 636–651.
- 45 Blackburn and Epel, The Telomere Effect.
- 46 Из личного общения с Зигфридом Хекими 26 марта 2019 года.
- 47 D. Warmflash, "Liz Parrish Is Patient Zero in Her Own Anti-Aging Experiment," The Crux, April 29, 2016, http://blogs.discovermagazine.com/crux/2016/04/29/liz-parrish-is-an-ceo-and-patient-zero/#.XLdySpNKjox.

- 48 J. W. Shay, "Role of Telomeres and Telomerase in Aging and Cancer," Cancer Discovery 6, no. 6 (2016): 584–593.
- 49 A. Regalado, "A Tale of Do-It-Yourself Gene Therapy," MIT Technology Review, October 14, 2015, https://www.technologyreview.com/s/542371/a-tale-of-do-it-yourself-gene-therapy/.
- 50 S. J. Olshansky, L. Hayflick, and B. A. Carnes, "No Truth to the Fountain of Youth," Scientific American 286, no. 6 (2002): 92–95.
- 51 S. J. Olshansky, "Is Life Extension Today a Faustian Bargain?," Frontiers in Medicine 4 (2017): 215.
- 52 K. McLaughlin and R. Winslow, "Report Details Dr. Atkins's Health Problems," The Wall Street Journal, February 10, 2004, https://www.wsj.com/articles/SB107637899384525268.
- 53 P. Kennedy, "No Magic Pill Will Get You to 100," The New York Times, March 9, 2018, p. SR1.
- 54 D. Cavett, "When That Guy Died on My Show," The New York Times, May 3, 2007, https://opinionator.blogs.nytimes.com/2007/05/03/when-that-guy-died-on-my-show/.
- 55 D. J. Baker et al., "Clearance of p16 Ink4a-Positive Senescent Cells Delays Ageing-Associated Disorders," Nature 479, no. 7372 (2011): 232.
- 56 M. Scudellari, "To Stay Young, Kill Zombie Cells," Nature 550, no. 7677 (2017): 448–450.
- 57 M. J. Schafer et al., "Cellular Senescence Mediates Fibrotic Pulmonary Disease," Nature Communications 8 (2017): 14532; O. H. Jeon et al., "Local Clearance of Senescent Cells Attenuates the Development of PostTraumatic Osteoarthritis and Creates a Pro-Regenerative Environment," Nature Medicine 23, no. 6 (2017): 775; D. J. Baker et al., "Naturally Occurring p16 Ink4aPositive Cells Shorten Healthy Lifespan," Nature 530, no. 7589 (2016): 184.
- 58 T. J. Bussian et al., "Clearance of Senescent Glial Cells Prevents Tau-Dependent Pathology and Cognitive Decline," Nature 562, no. 7728 (2018): 578.
- 59 Scudellari, "To Stay Young, Kill Zombie Cells."
- 60 Ibid.
- 61 Z. Corbyn, "Want to Live for Ever? Flush Out Your Zombie Cells," The Guardian, October 6, 2018, https://www.theguardian.com/science/2018/oct/06/race-to-kill-killer-zombie-cells-senescent-damaged-ageing-eliminate-research-mice-aubrey-de-grey.
- 62 Цит. по: Corbyn, "Want to Live for Ever?"
- 63 Из личного общения с Джеем Эллисоном 28 июля 2018 года.
- 64 Там же.
- 65 F. S. Hodi et al., "Two-Year Overall Survival Rates from a Randomised Phase 2 Trial Evaluating the Combination of Nivolumab and Ipilimumab versus Ipilimumab Alone in Patients with Advanced Melanoma," Lancet Oncology 17, no. 11 (2016): 1558.
- 66 A. Aoyagi et al., "A and Tau Prion-Like Activities Decline with Longevity in the Alzheimer's Disease Human Brain," Science Translational Medicine 11, no. 490 (2019): eaat8462.
- 67 Из личного общения со Стенли Прузинером 12 сентября 2019 года.

- 68 Из личного общения с Биллом Деградо 11 сентября 2019 года.
- 69 H. Cox, "Aubrey de Grey: Scientist Who Says Humans Can Live for 1,000 Years," Financial Times, February 18, 2017, https://www.ft.com/content/238cc916-e935-11e6-967b-c88452263daf.
- 70 A. D. N. J. de Grey, "Undoing Aging with Molecular and Cellular Damage Repair," MIT Technology Review, 2017, https://www.technologyreview.com/s/609576/undoing-aging-with-molecular-and-cellular-damage-repair/.
- 71 H. Warner et al., "Science Fact and the SENS Agenda: What Can We Reasonably Expect from Ageing Research?," EMBO Reports 6, no. 11 (2005): 1006–1008.
- 72 A. Kowald and T. B. Kirkwood, "Evolution of the Mitochondrial Fusion-Fission Cycle and Its Role in Aging," Proceedings of the National Academy of Sciences 108, no. 25 (2011): 10237–10242.
- 73 M. Kyriazis, "The Impracticality of Biomedical Rejuvenation Therapies: Translational and Pharmacological Barriers," Rejuvenation Research 17, no. 4 (2014): 390–396.
- 74 Warner et al., "Science Fact and the SENS Agenda".
- 75 N. Barzilai, "An Update on Anti-Aging Drug Trials," Innovation in Aging 2, suppl. 1 (2018): 544.
- 76 D. E. Harrison et al., "Rapamycin Fed Late in Life Extends Lifespan in Genetically Heterogeneous Mice," Nature 460, no. 7253 (2009): 392.
- 77 J. B. Mannick et al., "mTOR Inhibition Improves Immune Function in the Elderly," Science Translational Medicine 6, no. 268 (2014): 268ra179.
- 78 G. Garg et al., "Antiaging Effect of Metformin on Brain in Naturally Aged and Accelerated Senescence Model of Rat," Rejuvenation Research 20, no. 3 (2017): 173–182; M. G. Novelle et al., "Metformin: A Hopeful Promise in Aging Research," Cold Spring Harbor Perspectives in Medicine 6, no. 3 (2016): a025932.
- 79 PR Newswire, "Anti-Aging Human Study on Metformin Wins FDA Approval," December 16, 2015, https://www.prnewswire.com/news-releases/anti-aging-human-study-on-metformin-wins-fda-approval-300193724.html.
- 80 Y. Aman et al., "Therapeutic Potential of Boosting NAD+ in Aging and Age-Related Diseases," Translational Medicine of Aging (2018); S. I. Imai and L. Guarente, "NAD+ and Sirtuins in Aging and Disease," Trends in Cell Biology 24, no. 8 (2014): 464–471.
- 81 S. Loui, "Nicotinamide," Huntington's Outreach Project for Education at Stanford, June 29, 2010, https://hopes.stanford.edu/nicotinamide/#relationship-between-nicotinamide-and-nicotine.
- 82 J. Li et al., "A Conserved NAD+ Binding Pocket That Regulates Protein-Protein Interactions During Aging," Science 355, no. 6331 (2017): 1312–1317.
- 83 S. Dutta and P. Sengupta, "Men and Mice: Relating Their Ages," Life Sciences 152 (2016): 244–248.
- 84 R. W. Dellinger et al., "Repeat Dose NRPT (Nicotinamide Riboside and Pterostilbene) Increases NAD+ Levels in Humans Safely and Sustainably: A Randomized, Double-Blind, PlaceboControlled Study," NPJ Aging and Mechanisms of Disease 3, no. 1 (2017): 17.

- 85 C. R. Martens et al., "Chronic Nicotinamide Riboside Supplementation Is Well-Tolerated and Elevates NAD+ in Healthy Middle-Aged and Older Adults," Nature Communications 9, no. 1 (2018): 1286.
- 86 Цит. по: M. Bolotnikova, "Anti-Aging Approaches," Harvard Magazine, September—October 2017, https://harvardmagazine.com/2017/09/anti-aging-breakthrough.
- 87 Цит. по: M. Taylor, "A 'Fountain of Youth' Pill? Sure, If You're a Mouse," Kaiser Health News, February 11, 2019, https://khn.org/news/a-fountain-of-youth-pill-sure-if-youre-a-mouse/.
- 88 Из личного общения с Дэвидом Синклером 19 марта 2019 года.
- 89 S. Nowoshilow et al., "The Axolotl Genome and the Evolution of Key Tissue Formation Regulators," Nature 554, no. 7690 (2018): 50.
- 90 M. Lucanic et al., "Impact of Genetic Background and Experimental Reproducibility on Identifying Chemical Compounds with Robust Longevity Effects," Nature Communications 8 (2017): 14256.
- 91 R. Klausner, In Favor of Science: The Importance and Impact of Scientific Research, Minerva Schools at KGI (San Francisco: Consequent, 2019).
- 92 P. B. Baltes and J. Smith, "New Frontiers in the Future of Aging: From Successful Aging of the Young Old to the Dilemmas of the Fourth Age," Gerontology 49, no. 2 (2003): 123–135.
- 93 S. Sault, "If You Ask Richard Overton the Secret to Longevity, He'll Tell You God and Cigars Are the Answer," Texas Hill Country, June 15, 2017, https://texashill-country.com/richard-overton-the-secret-to-longevity/; B. Meyer, "At 112, America's Oldest Man Has the Secret to a Long Life: 'Just Keep Living. Don't Die,' "Dallas News, May 10, 2017, https://www.dallasnews.com/life/better-living/2018/05/10/americas-oldest-man-still-kicking-smoking-nears-112-secret-dont-die.

- 1 M. Melby-Lervåg and C. Hulme, "Is Working Memory Training Effective? A Meta-Analytic Review," Developmental Psychology 49, no. 2 (2013): 270.
- 2 A. Bahar-Fuchs, L. Clare, and B. Woods, "Cognitive Training and Cognitive Rehabilitation for Mild to Moderate Alzheimer's Disease and Vascular Dementia," Cochrane Database of Systematic Reviews 6 (2013); Stanford Center on Longevity, "A Consensus on the Brain Training Industry from the Scientific Community," October 20, 2014, http://longevity3.stanford.edu/blog/2014/10/15/the-consensus-on-the-brain-training-industry-from-the-scientific-community-2/.
- 3 Впоследствии сумма урегулирования была уменьшена до 2 миллионов долларов. Federal Trade Commission, "Lumosity to Pay \$2 Million to Settle FTC Deceptive Advertising Charges for Its 'Brain Training' Program," January 5, 2016, https://www.ftc.gov/news-events/press-releases/2016/01/lumosity-pay-2-million-settle-ftc-deceptive-advertising-charges.
- 4 E. L. Green, "BrainFunction Firm Backed by DeVos Misled in Ads," The New York Times, June 27, 2018, p. B3.
- 5 D. J. Simons et al., "Do 'BrainTraining' Programs Work?," Psychological Science in the Public Interest 17, no. 3 (2016): 103–186.

- 6 Simons et al., "Do 'Brain-Training' Programs Work?"
- 7 Simons et al., "Do 'Brain-Training' Programs Work?"
- 8 A. Shimamura, Get SMART! Five Steps toward a Healthy Brain (Scotts Valley, CA: CreateSpace, 2017).
- 9 B. Carey, "A Memory Jolt Raises Hopes," The New York Times, February 13, 2018, p. D1.
- 10 M. S. Gazzaniga, Human: The Science behind What Makes Your Brain Unique (New York: Harper Perennial, 2008). Я уже писал об этом в статье: D. J. Levitin, "Brain Candy," The New York Times, August 22, 2008, p. BR9.
- 11 A. D. Mohamed, "Neuroethical Issues in Pharmacological Cognitive Enhancement," Wiley Interdisciplinary Reviews: Cognitive Science 5, no. 5 (2014): 533–549; H. Maslen, N. Faulmüller, and J. Savulescu, "Pharmacological Cognitive Enhancement— How Neuroscientific Research Could Advance Ethical Debate," Frontiers in Systems Neuroscience 8 (2014): 107.
- 12 Presidential Committee for the Study of Bioethical Issues, "Gray Matters: Topics at the Intersection of Neuroscience, Ethics, and Society," March 2015, https://bioethicsarchive.georgetown.edu/pcsbi/sites/default/files/GrayMatter\_V2\_508.pdf.
- 13 A. L. Allen and N. K. Strand, "Cognitive Enhancement and Beyond: Recommendations from the Bioethics Commission," Trends in Cognitive Sciences 19, no. 10 (2015): 549–551.
- 14 K. L. Cropsey et al., "Mixed-Amphetamine Salts Expectancies among College Students: Is Stimulant Induced Cognitive Enhancement a Placebo Effect?," Drug and Alcohol Dependence 178 (2017): 302–309.
- 15 M. J. Farah et al., "When We Enhance Cognition with Adderall, Do We Sacrifice Creativity? A Preliminary Study," Psychopharmacology 202, nos. 1–3 (2009): 541–547.
- 16 P. Gerrard and R. Malcolm, "Mechanisms of Modafinil: A Review of Current Research," Neuropsychiatric Disease and Treatment 3, no. 3 (2007): 349.
- 17 M. J. Farah, "The Unknowns of Cognitive Enhancement," Science 350, no. 6259 (2015): 379–380.
- 18 R. M. Battleday and A.-K. Brem, "Modafinil for Cognitive Neuroenhancement in Healthy Non-Sleep-Deprived Subjects: A Systematic Review," European Neuropsychopharmacology 25 (2015): 1865–1881.
- 19 A. D. Mohamed, "The Effects of Modafinil on Convergent and Divergent Thinking of Creativity: A Randomized Controlled Trial," Journal of Creative Behavior 50, no. 4 (2014): 252–267.
- 20 A. D. Mohamed and C. R. Lewis, "Modafinil Increases the Latency of Response in the Hayling Sentence Completion Test in Healthy Volunteers: A Randomised Controlled Trial," PLoS One 9, no. 11 (2014): e110639.
- 21 L. Bäckman et al., "The Correlative Triad among Aging, Dopamine, and Cognition: Current Status and Future Prospects," Neuroscience and Biobehavioral Reviews 30, no. 6 (2006): 791–807.
- 22 T. E. Wilens et al., "Misuse and Diversion of Stimulants Prescribed for ADHD: A Systematic Review of the Literature," Journal of the American Academy of Child and Adolescent Psychiatry 47, no. 1 (2008): 21–31.

- 23 I. Smith, "Psychostimulants and Artistic, Musical, and Literary Creativity," in The Neuropsychiatric Complications of Stimulant Abuse, International Review of Neurobiology, vol. 120, ed. P. Taba, A. Lees, and K. Sikk, pp. 301–326 (Waltham, MA: Academic Press, 2015); S. J. Heishman, B. A. Kleykamp, and E. G. Singleton, "Meta-Analysis of the Acute Effects of Nicotine and Smoking on Human Performance," Psychopharmacology 210, no. 4 (2010): 453–469.
- 24 B. Hahn et al., "Nicotine Enhances Visuospatial Attention by Deactivating Areas of the Resting Brain Default Network," Journal of Neuroscience 27, no. 13 (2007): 3477–3489.
- 25 J. A. Gandelman, P. Newhouse, and W. D. Taylor, "Nicotine and Networks: Potential for Enhancement of Mood and Cognition in Late-Life Depression," Neuroscience and Biobehavioral Reviews 84 (2018): 289–298.
- 26 G. E. Barreto, A. Iarkov, and V. E. Moran, "Beneficial Effects of Nicotine, Cotinine and Its Metabolites as Potential Agents for Parkinson's Disease," Frontiers in Aging Neuroscience 6 (2015): 340; M. Kolahdouzan and M. J. Hamadeh, "The Neuroprotective Effects of Caffeine in Neurodegenerative Diseases," CNS Neuroscience and Therapeutics 23, no. 4 (2017): 272–290.
- 27 D. Hurley, "Will a Nicotine Patch Make You Smarter?," Scientific American, February 9, 2014, https://www.scientificamerican.com/article/will-a-nicotine-patch-make-you-smarter-excerpt/.
- 28 J. A. Apud et al., "Tolcapone Improves Cognition and Cortical Information Processing in Normal Human Subjects," Neuropsychopharmacology 32, no. 5 (2007): 1011.
- 29 N. Borges, "Tolcapone-Related Liver Dysfunction," Drug Safety 26, no. 11 (2003): 743–747.
- 30 J. Micallef et al., "Antiparkinsonian Drug-Induced Sleepiness: A Double-Blind Placebo-Controlled Study of L-Dopa, Bromocriptine and Pramipexole in Healthy Subjects," British Journal of Clinical Pharmacology 67, no. 3 (2009): 333–340; D. A. Pizzagalli et al., "Single Dose of a Dopamine Agonist Impairs Reinforcement Learning in Humans: Behavioral Evidence from a Laboratory-Based Measure of Reward Responsiveness," Psychopharmacology 196, no. 2 (2008): 221–232.
- 31 Из личного общения с Дэйвом Гамильтоном 8 июня 2019 года.
- 32 A. Ströhle et al., "Drug and Exercise Treatment of Alzheimer Disease and Mild Cognitive Impairment: A Systematic Review and Meta-Analysis of Effects on Cognition in Randomized Controlled Trials," American Journal of Geriatric Psychiatry 23, no. 12 (2015): 1234–1249; J. T. O'Brien et al., "Clinical Practice with Anti-Dementia Drugs: A Revised (Third) Consensus Statement from the British Association for Psychopharmacology," Journal of Psychopharmacology 31, no. 2 (2017): 147–168.
- 33 B. M. Altevogt, M. Davis, and D. E. Pankevich, eds., Glutamate-Related Biomarkers in Drug Development for Disorders of the Nervous System: Workshop Summary (Washington, DC: National Academies Press, 2011).
- 34 Из личного общения с Карлосом Квинтаной 21 мая 2018 года.

- 35 P. L. Santaguida, T. A. Shamliyan, and D. R. Goldmann, "Cholinesterase Inhibitors and Memantine in Adults with Alzheimer Disease," American Journal of Medicine 129, no. 10 (2016): 1044–1047.
- 36 C. M. Gameiro, F. Romão, and C. Castelo-Branco, "Menopause and Aging: Changes in the Immune System—A Review," Maturitas 67, no. 4 (2010): 316–320; C. Castelo-Branco and I. Soveral, "The Immune System and Aging: A Review," Gynecological Endocrinology 30, no. 1 (2014): 16–22.
- 37 A. Spector et al., "Efficacy of an Evidence-Based Cognitive Stimulation Therapy Programme for People with Dementia: Randomised Controlled Trial," British Journal of Psychiatry 183, no. 3 (2003): 248–254; J. D. Huntley et al., "Do Cognitive Interventions Improve General Cognition in Dementia? A Meta-Analysis and Meta-Regression," BMJ Open 5, no. 4 (2015): e005247.
- 38 J. Birks and J. G. Evans, "Ginkgo Biloba for Cognitive Impairment and Dementia," Cochrane Database of Systematic Reviews 1 (2009); J. Geng et al., "Ginseng for Cognition," Cochrane Database of Systematic Reviews 12 (2010); P. E. Gold, L. Cahill, and G. L. Wenk, "Ginkgo Biloba: A Cognitive Enhancer?," Psychological Science in the Public Interest 3, no. 1 (2002): 2–11; A. W. Rutjes et al., "Vitamin and Mineral Supplementation for Maintaining Cognitive Function in Cognitively Healthy People in Mid and Late Life," Cochrane Database of Systematic Reviews 12 (2018); Q. Yuan et al., "Effects of Ginkgo Biloba on Dementia: An Overview of Systematic Reviews," Journal of Ethnopharmacology 195 (2017): 1–9.
- 39 NIH Office of Dietary Supplements, "Vitamin B12," November 29, 2018, https://ods.od.nih.gov/factsheets/VitaminB12-HealthProfessional/.
- 40 G. Scalabrino, "The Multi-Faceted Basis of Vitamin B12 (Cobalamin) Neurotrophism in Adult Central Nervous System: Lessons Learned from Its Deficiency," Progress in Neurobiology 88, no. 3 (2009): 203–220.
- 41 D. Kennedy, "B Vitamins and the Brain: Mechanisms, Dose and Efficacy—A Review," Nutrients 8, no. 2 (2016): 68.
- 42 J. L. Reay, M. A. Smith, and L. M. Riby, "B Vitamins and Cognitive Performance in Older Adults," ISRN Nutrition 2013 (2013).
- 43 R. Malouf and A. A. Sastre, "Vitamin B12 for Cognition," Cochrane Database of Systematic Reviews 3 (2003).
- 44 D. M. Zhang et al., "Efficacy of Vitamin B Supplementation on Cognition in Elderly Patients with Cognitive Related Diseases: A Systematic Review and Meta-Analysis," Journal of Geriatric Psychiatry and Neurology 30, no. 1 (2017): 50–59.
- 45 R. L. Kane et al., "Interventions to Prevent Age-Related Cognitive Decline, Mild Cognitive Impairment, and Clinical Alzheimer's-Type Dementia," Comparative Effectiveness Reviews 188 (2017).
- 46 G. Douaud et al., "Preventing Alzheimer's Disease-Related Gray Matter Atrophy by B-Vitamin Treatment," Proceedings of the National Academy of Sciences 110, no. 23 (2013): 9523–9528.
- 47 B. Bistrian, "Should I Stop Taking These Vitamins?," Harvard Health Letter, May 2010.

- 48 PrimalHerb, https://primalherb.com/product/neuro-shroom/?rfsn=2393934.d10479. Я уже писал об этом в статье: D. J. Levitin, "What It Was Like Doing Mushrooms with Grateful Dead's Bob Weir," High Times, March 22, 2019.
- 49 E. Ulziijargal and J. L. Mau, "Nutrient Compositions of Culinary-Medicinal Mushroom Fruiting Bodies and Mycelia," International Journal of Medicinal Mushrooms 13, no. 4 (2011).
- 50 K. Mori et al., "Effects of Hericium erinaceus on Amyloid (25-35) Peptide-Induced Learning and Memory Deficits in Mice," Biomedical Research 32, no. 1 (2011): 67–72.
- 51 K. Mori et al., "Improving Effects of the Mushroom Yamabushitake (Hericium erinaceus) on Mild Cognitive Impairment: A Double-Blind Placebo-Controlled Clinical Trial," Phytotherapy Research 23, no. 3 (2009): 367–372.
- 52 M. Nagano et al., "Reduction of Depression and Anxiety by 4 Weeks Hericium erinaceus Intake," Biomedical Research 31, no. 4 (2010): 231–237.
- 53 H. Zhao et al., "Spore Powder of Ganoderma lucidum Improves Cancer-Related Fatigue in Breast Cancer Patients Undergoing Endocrine Therapy: A Pilot Clinical Trial," Evidence-Based Complementary and Alternative Medicine 2012 (2012).
- 54 Y. Zhou et al., "Neuroprotective Effect of Preadministration with Ganoderma lucidum Spore on Rat Hippocampus," Experimental and Toxicologic Pathology 64, nos. 7–8 (2012): 673–680.
- 55 S. Huang et al., "Polysaccharides from Ganoderma lucidum Promote Cognitive Function and Neural Progenitor Proliferation in Mouse Model of Alzheimer's Disease," Stem Cell Reports 8, no. 1 (2017): 84–94.
- 56 W. B. Stavinoha, "Status of Ganoderma lucidum in United States: Ganoderma lucidum as an Anti-Inflammatory Agent," in Proceedings of the 1st International Symposium on Ganoderma Lucidum in Japan, pp. 17–18 (2008).
- 57 W. J. Li et al., "Ganoderma atrum Polysaccharide Attenuates Oxidative Stress Induced by D-Galactose in Mouse Brain," Life Sciences 88, nos. 15–16 (2011): 713–718.
- 58 L. Feng et al., "The Association between Mushroom Consumption and Mild Cognitive Impairment: A Community-Based Cross-Sectional Study in Singapore," Journal of Alzheimer's Disease 68 (2019): 197–203.
- 59 S. C. Pierce et al., "Hydrology and Species-Specific Effects of Bacopa monnieri and Leersia oryzoides on Soil and Water Chemistry," Ecohydrology: Ecosystems, Land and Water Process Interactions, Ecohydrogeomorphology 2, no. 3 (2009): 279–286.
- 60 C. Stough et al., "The Chronic Effects of an Extract of Bacopa monniera (Brahmi) on Cognitive Function in Healthy Human Subjects," Psychopharmacology 156, no. 4 (2001): 481–484.
- 61 S. Roodenrys et al., "Chronic Effects of Brahmi (Bacopa monnieri) on Human Memory," Neuropsychopharmacology 27, no. 2 (2002): 279.
- 62 P. D. Charles et al., "Bacopa monniera Leaf Extract Up-Regulates Tryptophan Hydroxylase (TPH2) and Serotonin Transporter (SERT) Expression: Implications in Memory Formation," Journal of Ethnopharmacology 134, no. 1 (2011): 55–61.

- 63 L. Mlodinow, Elastic: Flexible Thinking in a Time of Change (New York: Pantheon, 2018). (*Млодинов Л.* Эластичность. Гибкое мышление в эпоху перемен. М.: Livebook, 2020.)
- 64 Hopkins Medicine Staff, "Single Dose of Hallucinogen May Create Lasting Personality Change," September 29, 2011, https://www.hopkinsmedicine.org/news/media/releases/single dose of hallucinogen may create lasting personality change.
- 65 J. Zack, "Michael Pollan Takes a Trip in His Latest Book, 'How to Change Your Mind,' "San Francisco Chronicle, May 21, 2018, https://www.sfchronicle.com/books/article/Michael-Pollan-gets-stoned-in-his-latest-book-12932010.php.
- 66 D. Nutt, Drugs without the Hot Air: Minimising the Harms of Legal and Illegal Drugs (Cambridge: UIT Cambridge, 2012), p. 254.
- 67 S. Belli, "A Psychobiographical Analysis of Brian Douglas Wilson: Creativity, Drugs, and Models of Schizophrenic and Affective Disorders," Personality and Individual Differences 46, no. 8 (2009): 809–819. См. также: D. H. Linszen, P. M. Dingemans, and M. E. Lenior, "Cannabis Abuse and the Course of Recent-Onset Schizophrenic Disorders," Archives of General Psychiatry 51, no. 4 (1994): 273–279
- 68 J. Saliba et al., "Functional Near-Infrared Spectroscopy for Neuroimaging in Cochlear Implant Recipients," Hearing Research 338 (2016): 64–75.
- 69 A. P. Sanderson et al., "Exploiting Routine Clinical Measures to Inform Strategies for Better Hearing Performance in Cochlear Implant Users," Frontiers in Neuroscience 12 (2019).
- 70 J. M. Bronstein et al., "Deep Brain Stimulation for Parkinson Disease: An Expert Consensus and Review of Key Issues," Archives of Neurology 68, no. 2 (2011): 165.
- 71 A. M. Lozano et al., "Subcallosal Cingulate Gyrus Deep Brain Stimulation for Treatment-Resistant Depression," Biological Psychiatry 64, no. 6 (2008): 461–467.
- 72 Y. Ezzyat et al., "Closed-Loop Stimulation of Temporal Cortex Rescues Functional Networks and Improves Memory," Nature Communications 9, no. 1 (2018): 365.
- 73 Цит. по: В. Carey, "'Pacemaker' for the Brain Can Help Memory, Study Finds," The New York Times, April 21, 2017, p. A19.
- 74 B. Carey, "A Brain Implant Improved Memory, Scientists Report," The New York Times, February 7, 2018, p. A17.
- 75 E. Landau, "Artificial Hand Lets Amputee Feel Object," CNN, February 6, 2014, https://www.cnn.com/2014/02/05/health/bionic-hand/index.html.
- 76 Цит. по: R. Godwin, "We Will Get Regular Body Upgrades: What Will Humans Look Like in 100 Years?," The Guardian, September 22, 2018.
- 77 C. E. Bouton et al., "Restoring Cortical Control of Functional Movement in a Human with Quadriplegia," Nature 533, no. 7602 (2016): 247.
- 78 Я признателен Дэну Кауфману за эту идею.
- 79 Z. Istvan, "I Just Got a Computer Chip Implanted in My Hand and the Rest of the World Won't Be Far Behind," Business Insider, September 25, 2015.
- 80 S. Jeffries, "Neil Harbisson: The World's First Cyborg Artist," The Guardian, May 6, 2014. Позвольте внести ясность: Харбиссон не может просматривать веб-страницы с помощью мозга или получать видеоизображения, которые отображались бы на чем-то вроде мысленного экрана. Люди с Bluetooth могут отправлять и принимать звуковые сигналы посредством встроенного

- в зуб импланта, который передает звук в головной мозг при помощи костной проводимости. М. Franco, "Antenna Implanted in Cyborg's Skull Gets Wi-Fi, Color as Sound," CNET, April 14, 2014, https://www.cnet.com/news/cyborg-interview-hear-colors-with-antenna-in-your-skull/.
- 81 A. Mandavilli, "A Patch Uses Sweat to Get a Read on Your Body's Toil," The New York Times, January 21, 2019, p. B3.
- 82 A. Stych, "Serena Williams Rocks Wearable Tech in Gatorade Ad," The Business Journals, December 27, 2018.
- 83 J. A. Brewer et al., "Meditation Experience Is Associated with Differences in Default Mode Network Activity and Connectivity," Proceedings of the National Academy of Sciences 108, no. 50 (2011): 20254–20259; K. A. Garrison et al., "Meditation Leads to Reduced Default Mode Network Activity beyond an Active Task," Cognitive, Affective, and Behavioral Neuroscience 15, no. 3 (2015): 712–720.
- 84 J. D. Creswell et al., "Alterations in Resting-State Functional Connectivity Link Mindfulness Meditation with Reduced Interleukin-6: A Randomized Controlled Trial," Biological Psychiatry 80, no. 1 (2016): 53–61.
- 85 J. H. Jang et al., "Increased Default Mode Network Connectivity Associated with Meditation," Neuroscience Letters 487, no. 3 (2011): 358–362; S. W. Lazar et al., "Meditation Experience Is Associated with Increased Cortical Thickness," Neuroreport 16, no. 17 (2005): 1893; R. E. Wells et al., "Meditation's Impact on Default Mode Network and Hippocampus in Mild Cognitive Impairment: A Pilot Study," Neuroscience Letters 556 (2013): 15–19; K. C. Fox et al., "Is Meditation Associated with Altered Brain Structure? A Systematic Review and Meta-Analysis of Morphometric Neuroimaging in Meditation Practitioners," Neuroscience and Biobehavioral Reviews 43 (2014): 48–73.
- 86 F. Zeidan et al., "Mindfulness Meditation Improves Cognition: Evidence of Brief Mental Training," Consciousness and Cognition 19, no. 2 (2010): 597–605.
- 87 M. A. Cohn and B. L. Fredrickson, "In Search of Durable Positive Psychology Interventions: Predictors and Consequences of Long-Term Positive Behavior Change," Journal of Positive Psychology 5, no. 5 (2010): 355–366.
- 88 M. A. Rosenkranz et al., "Reduced Stress and Inflammatory Responsiveness in Experienced Meditators Compared to a Matched Healthy Control Group," Psychoneuroendocrinology 68 (2016): 117–125.
- 89 E. Walsh, T. Eisenlohr-Moul, and R. Baer, "Brief Mindfulness Training Reduces Salivary IL-6 and TNF- in Young Women with Depressive Symptomatology," Journal of Consulting and Clinical Psychology 84, no. 10 (2016): 887.
- 90 P. Kaliman et al., "Rapid Changes in Histone Deacetylases and Inflammatory Gene Expression in Expert Meditators," Psychoneuroendocrinology 40 (2014): 96–107.
- 91 J. A. Dusek et al., "Genomic CounterStress Changes Induced by the Relaxation Response," PLoS One 3, no. 7 (2008): e2576; H. Lavretsky et al., "A Pilot Study of Yogic Meditation for Family Dementia Caregivers with Depressive Symptoms: Effects on Mental Health, Cognition, and Telomerase Activity," International Journal of Geriatric Psychiatry 28, no. 1 (2013): 57–65; E. Luders et al., "The Unique Brain Anatomy of Meditation Practitioners: Alterations in Cortical Gyrification," Frontiers in Human Neuroscience 6, (2012): 34.

- 92 J. D. Creswell et al., "Mindfulness-Based Stress Reduction Training Reduces Loneliness and ProInflammatory Gene Expression in Older Adults: A Small Randomized Controlled Trial," Brain, Behavior, and Immunity 26, no. 7 (2012): 1095–1101.
- 93 N. S. Schutte and J. M. Malouff, "A MetaAnalytic Review of the Effects of Mindfulness Meditation on Telomerase Activity," Psychoneuroendocrinology 42 (2014): 45–48; T. L. Jacobs et al., "Intensive Meditation Training, Immune Cell Telomerase Activity, and Psychological Mediators," Psychoneuroendocrinology 36, no. 5 (2011): 664–681.
- 94 J. Russell-Williams et al., "Mindfulness and Meditation: Treating Cognitive Impairment and Reducing Stress in Dementia," Reviews in the Neurosciences 29, no. 7 (2018): 791–804.

- 1 Цит. по: N. Narboe, ed., Aging: An Apprenticeship (Portland, OR: Red Notebook Press), p. 80.
- 2 D. Velleman, "Well-Being and Time," Pacific Philosophical Quarterly 72, no. 1 (1991): 48–77.
- 3 M. Slote, Goods and Virtues (New York: Oxford University Press, 1983).
- 4 E. Diener, D. Wirtz, and S. Oishi, "End Effects of Rated Life Quality: The James Dean Effect," Psychological Science 12, no. 2 (2001): 124–131.
- 5 См. также: J. Glasgow, "The Shape of a Life and the Value of Loss and Gain," Philosophical Studies 162, no. 3 (2013): 665–682.
- 6 Nature Editorial Staff, "Study the Survivors," Nature 568 (2019): 143; R. Garza, "Children's Cancer Research to Expand, with Help from Local Oncologist, Survivor," Rivard Report, June 11, 2018, https://therivardreport.com/childrens-cancer-research-to-expand-with-help-from-local-oncologist-survivor/.
- 7 H. S. Friedman and M. L. Kern, "Personality, Well-Being and Health," Annual Reviews of Psychology 65 (2014): 719–742.
- 8 D. G. Blanchflower and A. J. Oswald, "Is Well-Being U-Shaped over the Life Cycle?," Social Science and Medicine 66, no. 8 (2008): 1733–1749.
- 9 Пинк кратко излагает аргументы, приведенные социологом Ханнесом Швандтом. D. H. Pink, When: The Scientific Secrets of Perfect Timing (New York: Penguin Press, 2019). (Пинк Д. Таймхакинг. Как наука помогает нам делать все вовремя. М.: Альпина Паблишер, 2018.)
- 10 L. L. Carstensen and M. DeLiema, "The Positivity Effect: A Negativity Bias in Youth Fades with Age," Current Opinion in Behavioral Sciences 19 (2018): 7–12.
- 11 M. Mather, "The Affective Neuroscience of Aging," Annual Review of Psychology 67 (2016): 213–238; L. K. Sasse et al., "Selective Control of Attention Supports the Positivity Effect in Aging," PloS One 9, no. 8 (2014): e104180.
- 12 Из личного общения с Сонни Роллинзом, июнь 2018 года.
- 13 См., например: Economist Intelligence Unit, "The Economist Intelligence Unit's Quality-of-Life Index," 2005, http://www.economist.com/media/pdf/QUALITY\_OF\_LIFE.pdf; European Union European Commission, "Quality

- of Life Indicators," 2013, https://ec.europa.eu/eurostat/statistics-explained/index.php/Quality\_of\_life\_indicators; P. Haslam, J. Schafer, and P. Beaudet, eds., Introduction to International Development: Approaches, Actors, and Issues, 2nd ed. (Don Mills: Oxford University Press, 2012); D. Kahneman and A. B. Krueger, "Developments in the Measurement of Subjective Well-Being," Journal of Economic Perspectives 20, no. 1 (2006): 3–24; United Nations Development Program, Human Development Report, 2013, http://hdr.undp.org/en/statistics/hdi/. I thank my McGill honors students Lauren Guttman, Jane Stocks, and Noa Yaakoba-Zohar for bringing these issues and papers to my attention.
- 14 M. J. Hornsey et al., "How Much Is Enough in a Perfect World? Cultural Variation in Ideal Levels of Happiness, Pleasure, Freedom, Health, Self-Esteem, Longevity, and Intelligence," Psychological Science 29, no. 9 (2018): 1393–1404. См. также: Y. Uchida and S. Kitayama, "Happiness and Unhappiness in East and West: Themes and Variations," Emotion 9 (2009): 441–456.
- 15 A. Chiu, "Americans Are the Unhappiest They've Ever Been, U.N. Report Finds. An 'Epidemic of Addictions' Could Be to Blame," The Washington Post, March 21, 2019.
- 16 Цит. по: Chiu, "Americans Are the Unhappiest."
- 17 Там же.
- 18 J. M. Twenge and W. K. Campbell, "Associations between Screen Time and Lower Psychological Well-Being among Children and Adolescents: Evidence from a Population-Based Study," Preventive Medicine Reports 12, no. 271 (2018).
- 19 Chiu, "Americans Are the Unhappiest."
- 20 R. Waldinger, "What Makes a Good Life? Lessons from the Longest Study on Happiness," TEDx Beacon Street, 2016, https://www.youtube.com/watch?v=8KkKuTCFvzI.
- 21 Waldinger, "What Makes a Good Life?"
- 22 C. Gregoire, "The 75-Year Study That Found the Secrets to a Fulfilling Life," Huffington Post, August 11, 2013, http://www.huffingtonpost.com/2013/08/11/how-this-harvard-psycholo n 3727229.html.
- 23 J. W. Shenk, "What Makes Us Happy?," The Atlantic, June 2009, https://www.theatlantic.com/magazine/archive/2009/06/what-makes-us-happy/307439/.
- 24 Цит. по: Shenk, "What Makes Us Happy?"
- 25 G. Vaillant, "The Importance of Relationships to Health, Resilience, and Ageing," Edith Dominian Memorial Lecture, London, UK, June 2014, https://www.youtube.com/watch?v=XHnuReGjkws.
- 26 Vaillant, "The Importance of Relationships."
- 27 C. Lambert, "Deep Cravings," Harvard Magazine, March 1, 2000, http://harvard-magazine.com/2000/03/deep-cravings.html.
- 28 Повышение супружеской удовлетворенности на одно стандартное отклонение связано со снижением уровня смертности на 13 процентов; повышение супружеской удовлетворенности на два стандартных отклонения связано со снижением уровня смертности на 25 процентов. О. Stavrova, "Having a Happy Spouse Is Associated with Lowered Risk of Mortality," Psychological Science (2019): 0956797619835147.

- 29 Из личного общения с Ламоном Дозье 26 июля 2018 года.
- 30 M. A. Killingsworth and D. T. Gilbert, "A Wandering Mind Is an Unhappy Mind," Science 330, no. 6006 (2010): 932.
- 31 N. Maestas, "Back to Work Expectations and Realizations of Work after Retirement," Journal of Human Resources 45, no. 3 (2010): 718–748; A. Mergenthaler et al., "The Changing Nature of (Un-)Retirement in Germany: Living Conditions, Activities and Life Phases of Older Adults in Transition" (working paper); L. G. Platts et al., "Returns to Work after Retirement: A Prospective Study of Unretirement in the United Kingdom," Ageing and Society 39, no. 3 (2019): 439–464; R. Kanabar, "Unretirement in England: An Empirical Perspective" (discussion paper, Department of Economics and Related Studies, University of York, 2012).
- 32 Цит. по: P. Span, "When Retirement Doesn't Quite Work Out," The New York Times, April 3, 2018, p. D5.
- 33 I. Chotiner, "Barbara Ehrenreich Doesn't Have Time for Self-Care," Slate, April 13, 2018, https://slate.com/news-and-politics/2018/04/barbara-ehrenreich-says-smoking-bans-are-a-war-on-the-working-class.html.
- 34 Обзор законов сорока стран в отношении возрастной дискриминации можно найти здесь: AgeDiscrimination.info, http://www.agediscrimination.info/international-age-discrimination/.
- 35 "The Joys of Living to 100," The Economist, July 6, 2017, https://www.economist.com/special-report/2017/07/06/the-joys-of-living-to-100.
- 36 K. Allen, "Alzheimer's and Employment," BrightFocus, October 24, 2017, https://www.brightfocus.org/alzheimers/article/alzheimers-and-employment.
- 37 A. Shaw, "London Heathrow Set to Become World's First 'Dementia-Friendly' Airport," The Sunday Post, September 2, 2018, https://www.sundaypost.com/fp/positive-progress-for-heathrow-with-dementia-friends/#r3z-addoor.
- 38 P. B. Harris and C. A. Caporella, "Making a University Community More Dementia Friendly through Participation in an Intergenerational Choir," Dementia (2018): 1471301217752209.
- 39 Wikipedia, s.v. Pat Summitt, updated July 14, 2019, https://en.wikipedia.org/wiki/Pat Summitt. (https://ru.wikipedia.org/wiki/Саммитт, Пэт.)
- 40 M. C. Carlson et al., "Impact of the Baltimore Experience Corps Trial on Cortical and Hippocampal Volumes," Alzheimer's and Dementia 11, no. 11 (2015): 1340–1348.
- 41 C. A. Dingle, Memorable Quotations: French Writers of the Past (iUniverse, 2000), p. 126.
- 42 J. M. Coetzee: J. M. Coetzee, Disgrace (New York: Viking, 1999). (*Кутзее Дж.* Бечестье. М.: Эксмо, 2009.)
- 43 S. Duffy and T. H. Lee, "In-Person Health Care as Option B," New England Journal of Medicine 378, no. 2 (2018): 104–106.
- 44 D. J. P. Gray et al., "Continuity of Care with Doctors— A Matter of Life and Death? A Systematic Review of Continuity of Care and Mortality," BMJ Open 8, no. 6 (2018): e021161.

- 45 "The History of San Francisco Otolaryngology," n.d., http://www.sfotomed.com/history.html.
- 46 Из личного общения с Эдуардо Долхуном 9 июля 2013 года.
- 47 R. Yeravdekar, V. R. Yeravdekar, and M. A. Tutakne, "Family Physicians: Importance and Relevance," Journal of the Indian Medical Association 110, no. 7 (2012): 490–493.
- 48 "Why Keeping the Same Doctor Can Help You Live Longer," HealthLine, https://www.healthline.com/health-news/same-doctor-help-you-live-longer#1.
- 49 G. L. Jackson et al., "The Patient-Centered Medical Home: A Systematic Review," Annals of Internal Medicine 158, no. 3 (2013): 169–178; Patient-Centered Primary Care Collaborative, "Defining the Medical Home," https://www.pcpcc.org/about/medical-home; K. C. Stange et al., "Defining and Measuring the Patient-Centered Medical Home," Journal of General Internal Medicine 25, no. 6 (2010): 601–612; The Commonwealth Fund, "Primary Care: Our First Line of Defense," June 12, 2013, https://www.pcpcc.org/resource/primary-care-our-first-line-defense.
- 50 Из личного общения с Гордоном Колдуэллом 27 марта 2019 года.
- 51 J. F. Coughlin, "Three Questions That Can Predict Future Quality of Life," MIT AgeLab, n.d., http://agelab.mit.edu/system/files/2018-12/three\_questions\_that\_can\_predict\_future\_quality\_of\_life\_0.pdf.
- 52 Argentum, "Senior Living Innovation Series: Memory Care" (white paper, 2016). Полное раскрытие информации: в Argentum мне заплатили за выступление на ежегодной конференции, но я написал этот раздел до того, как получил это приглашение, поэтому оно не повлияло на мое решение включить упоминание об этой компании в книгу.
- 53 CVS, "Multi-Dose Packs," https://www.cvs.com/content/multidose; Pill Pack, https://www.pillpack.com/.
- 54 https://www.medicare.gov/hospitalcompare.
- 55 A. Frakt, "Why It's Crucial to Choose the Right Hospital," The New York Times, August 22, 2016, p. A3.
- 56 См., например: "ER Wait Watcher," ProPublica, https://projects.propublica.org/emergency/.
- 57 A. Lickerman, "The Best Disease from Which to Die," Psychology Today, September 9, 2012, https://www.psychologytoday.com/us/blog/happiness-in-world/201209/the-best-disease-which-die.
- 58 P. Span, "One Day Your Mind May Fade. But You Can Plan Ahead," The New York Times, January 23, 2018, p. D5. Заблаговременное распоряжение на случай деменции, разработанное доктором Гастером, можно найти здесь: Advance Directive for Dementia, https://dementia-directive.org/.
- 59 B. Gaster, E. B. Larson, and J. R. Curtis, "Advance Directives for Dementia: Meeting a Unique Challenge," Journal of the American Medical Association 318, no. 22 (2017): 2175–2176.
- 60 G. Steinem, "Into the Seventies," in Aging: An Apprenticeship, ed. N. Narboe, p. 177 (Portland, OR: Red Notebook Press, 2017).
- 61 У певца и автора песен Конора Оберста есть песня I Don't Want to Die (in the Hospital) («Я не хочу умирать в больнице): https://www.youtube.com/watch? v=-JoCQhh3\_pE.

- 62 R. Sinatra, "Causes and Consequences of Inadequate Management of Acute Pain," Pain Medicine 11 (2010): 1859–1871, http://dx.doi.org/10.1111/j.1526-4637.2010.00983.x.
- 63 K. Tanja-Dijkstra et al., "The Soothing Sea: A Virtual Coastal Walk Can Reduce Experienced and Recollected Pain," Environment and Behavior 50, no. 6 (2018): 599–625.
- 64 Ibid.
- 65 T. O. Iyendo, "Exploring the Effect of Sound and Music on Health in Hospital Settings: A Narrative Review," International Journal of Nursing Studies 63 (2016): 82–100.
- 66 Cm. M. Jonwiak, "Nature Scenes and Hospital Recovery," September 15, 2016, Association of Nature and Forest Therapy.
- 67 D. Franklin, "How Hospital Gardens Help Patients Heal," Scientific American, March 1, 2012, https://www.scientificamerican.com/article/nature-that-nurtures/.
- 68 J. Ference, "Nature's Calming Influence," Health Facilities Management 23, no. 7 (2010): 44.
- 69 R. Clarke, "In Life's Last Moments, Open a Window," The New York Times, September 9, 2018, p. SR7.
- 70 Цит. по: L. Hawkins, "The Uplifting Power of Nature at the End of Life," e-hospice, November 23, 2018, https://ehospice.com/uk\_posts/the-uplifting-power-of-nature-at-the-end-of-life/.
- 71 Цит. по: J. Rockwell, "Dennis Potter's Last Interview, on 'Nowness' and His Work," The New York Times, June 12, 1994, p. 2002030.
- 72 Написано со слов Камиль Суини в статье: L. H. Lapham, "Old Masters," The New York Times Magazine, October 23, 2014, https://www.nytimes.com/interactive/2014/10/23/magazine/old-masters-at-top-of-their-game.
- 73 L. Fratiglioni et al., "Influence of Social Network on Occurrence of Dementia: A Community-Based Longitudinal Study," Lancet 355, no. 9212 (2000): 1315–1319.
- 74 S. Ni et al., "Effect of Gratitude on Loneliness of Chinese College Students: Social Support as a Mediator," Social Behavior and Personality 43, no. 4 (2015): 559–566.
- 75 Цит. по: J. Barone, "Placido Domingo Nears the Unthinkable," The New York Times, August 23, 2018, p. C1.
- 76 Написано со слов Камиль Суини в статье: Lapham, "Old Masters."
- 77 H. S. Friedman and M. L. Kern, "Personality, Well-Being, and Health," Annual Reviews of Psychology 65 (2014): 719–742.
- 78 K. Dychtwald, "Will the 'Age Wave' Make or Break America? The Questions That Trump, Clinton and Sanders Must Answer," Huffington Post, May 19, 2017, http://agewave.com/media\_files/05%2018%2016%20HP\_Questions.pdf.
- 79 G. Vradenburg, personal communication, March 28, 2019. Vradenburg is the CEO of USAgainstAlzheimer's.
- 80 G. Steinem, Boston Speaker Series: Gloria Steinem, Boston Speakers Series, Boston, MA, January 9, 2019.

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- С. 171. Изображение любезно предоставлено Джеймсом Адамсом.
- C. 204. Рисунок взят из: A. Fiske, J. L. Wetherell, and M. Gatz, "Depression in Older Adults," Annual Review of Clinical Psychology 5 (2009): 363–389.
- С. 261. Используется по лицензии Creative Commons.
- С. 263. Рисунок скопировала Линдси Флеминг из: М. С. Bushnell, M. Čeko, and L. A. Low, "Cognitive and Emotional Control of Pain and Its Disruption in Chronic Pain," Nature Reviews Neuroscience 14, no. 7 (2013): 502.
- С. 293. Используется по лицензии Creative Commons.
- C. 294. Рисунок сделала Линдси Флеминг на основе: S. Hood and S. Amir, "The Aging Clock: Circadian Rhythms and Later Life," Journal of Clinical Investigation 127, no. 2 (2017): 437–446.
- C. 350. Рисунок скопировала Флеминг из: S. G. Wannamethee, A. G. Shaper, and M. Walker, "Changes in Physical Activity, Mortality, and Incidence of Coronary Heart Disease in Older Men," Lancet 351, no. 9116 (1998): 1603–1608.
- C. 383. Рисунок скопировала Линдси Флеминг из: E. Dolgin, "There's No Limit to Longevity, Says Study That Revives Human Lifespan Debate," Nature (2018), https://www.nature.com/articles/d41586-018-05582-3.
- C. 440. Рисунок скопировала Линдси Флеминг из: A. A. Stone et al., "A Snapshot of the Age Distribution of Psychological Well-Being in the United States," Proceedings of the National Academy of Sciences 107, no. 22 (2010): 9985–9990.
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