

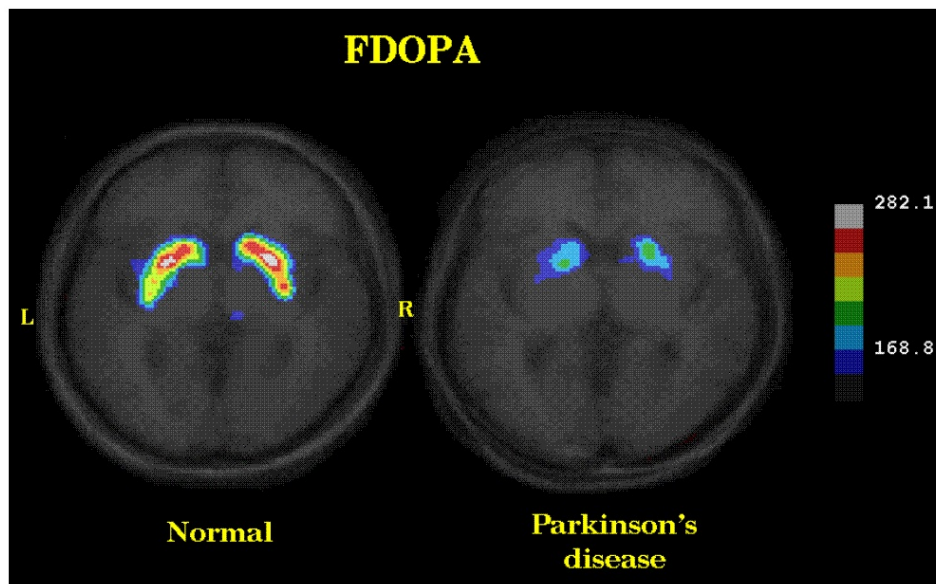
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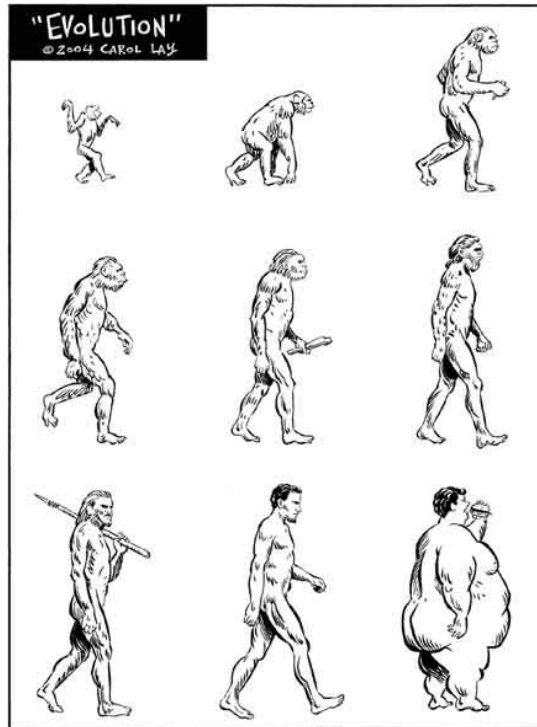
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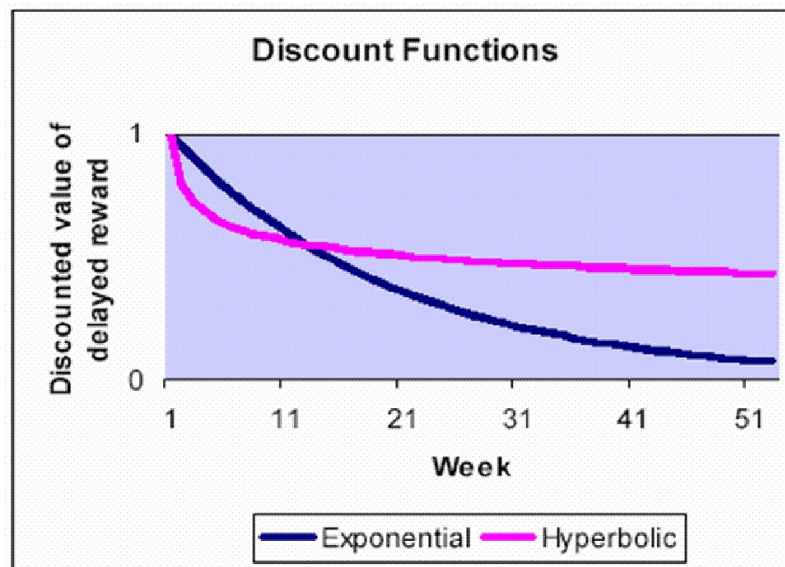
YEARS AGO	GENERATIONS (assuming 1 per 20/yr)	
4,000,000,000		First life on earth
1,000,000,000		Multi-cellular life
600,000,000		'Explosion' of Life forms
200,000,000	Millions	First Mammal
5,700,000	285,000	Chimp/Human Split
1,100,000	55,000	Early Homo Sapiens
200,000	10,000	Modern Homo Sapiens
10,000	500	Agricultural Revolution
150	7	Industrial Revolution / Oil

A 20x20 grid of black squares. A blue border is visible on the top, bottom, and right sides. A blue 'X' mark is located in the bottom right corner, formed by a 3x3 grid of blue squares. The grid is composed of 400 black squares in total.









The graph illustrates the difference between exponential and hyperbolic discounting. Exponential discounting represents a constant discount rate over time, while hyperbolic discounting represents a discount rate that decreases as the delay increases. This is why the hyperbolic curve is steeper initially but levels off more gradually than the exponential curve.

In the context of decision-making, these curves represent the subjective value of a reward that is delayed. The exponential curve suggests that the value of a reward drops off more quickly than what is typically observed in human behavior, which is better captured by the hyperbolic curve.

The graph shows that the hyperbolic discount function is more consistent with empirical data on human time discounting than the exponential function.

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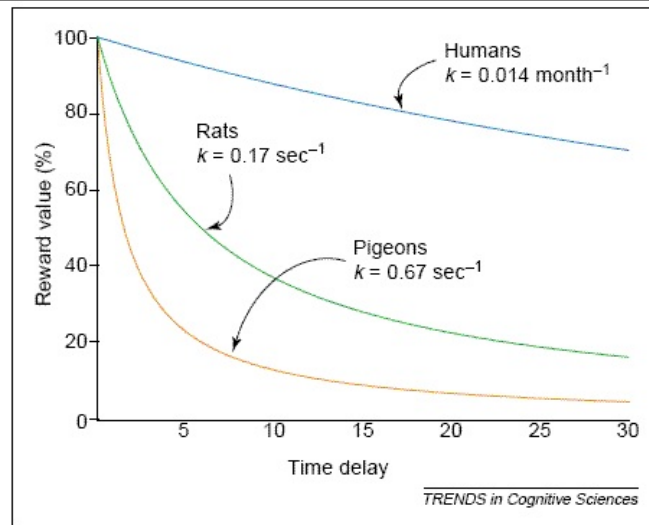


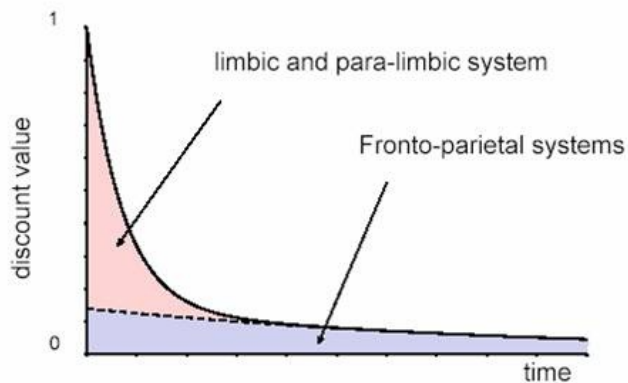
Figure 3. The discounting rate describes the steepness of the discounting function – that is, how quickly the reward is devalued over time. The hyperbolic model of discounting is described by $V = A/(1 + kD)$, where V is the subjective value of the reward, A is the amount of the reward, D is the delay to reward, and k is a free parameter describing the discounting rate. This discounting rate k has been estimated for pigeons and rats, suggesting that both species rapidly devalue food delayed in a matter of seconds [27,28]. Similar experiments on humans suggest that we devalue money at a much lower rate, on the order of months rather than seconds [29]. (Note that the Time delay axis has dual units. Discounting functions plotted from k values reported in Mazur [27], Richards *et al.* [28], and Rachlin *et al.* [29]).

the brain is a complex system that is constantly changing and adapting to its environment. The brain is made up of billions of neurons that are connected in a complex network. This network allows the brain to process information and make decisions. The brain is also responsible for controlling the body's movements and emotions. The brain is a remarkable organ that is capable of incredible feats of intelligence and creativity.

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Brain and Decision Making

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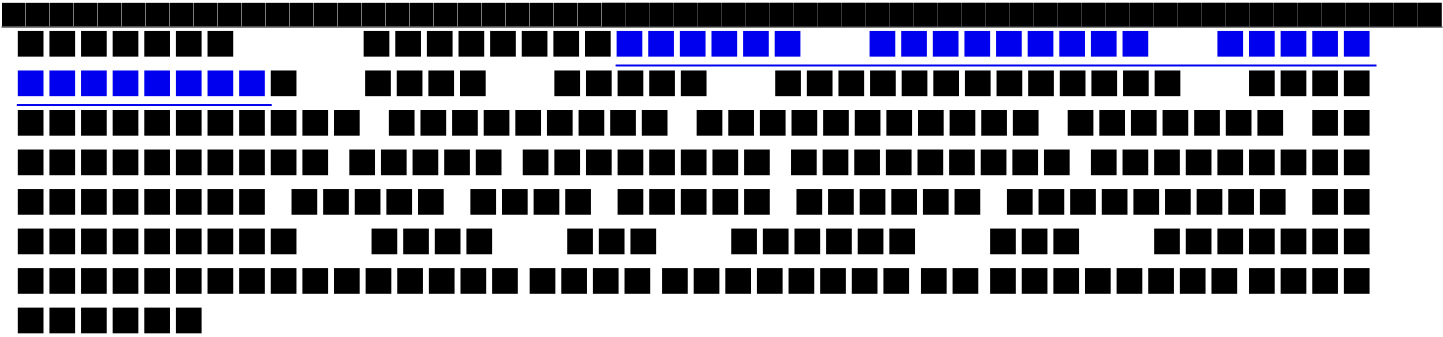
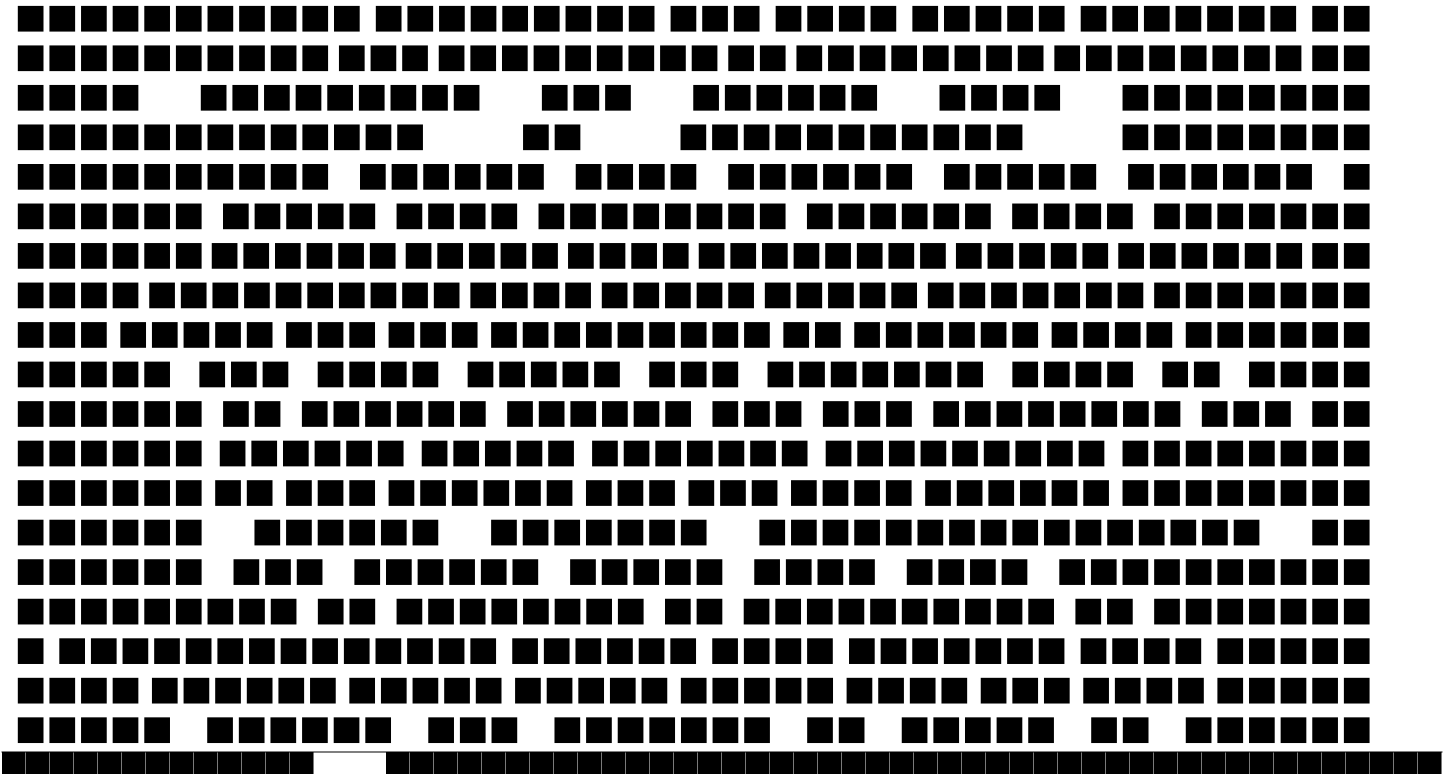


Table 2. Representative empirical studies linking estimated discount rates for monetary rewards to various individual behaviors and traits. Studies marked with an asterisk (*) used hypothetical rewards; others used real rewards. *N* = total # of participants in study.

Variable	Study	<i>N</i>	Discount Rate Findings
<i>Nicotine</i>	Bickel, Odum, & Madden (1999)*	66	Current smokers > never-smokers and ex-smokers
<i>Alcohol</i>	Bjork, Hommer, Grant, & Danube (2004)	160	Abstinent alcohol-dependent subjects > controls
<i>Cocaine</i>	Coffey, Gudleski, Saladin, & Brady (2003)*	25	Crack-dependent subjects > matched controls ^d
<i>Heroin</i>	Kirby, Petry, & Bickel (1999)	116	Heroin addicts > age-matched controls
<i>Gambling</i>	Petry (2001b)*	86	Pathological gamblers ^b > controls
<i>Risky Behavior</i>	Odum, Madden, Badger, & Bickel (2000)*	32	Heroin addicts agreeing to share needle in a hypothetical scenario > non-agreeing addicts
<i>Age</i>	Green, Fry, & Myerson (1994)*	36	Children > young adults > older adults
<i>Psychiatric Disorders</i>	Crean, de Wit, & Richards (2000)	24	“High risk” patients ^c > “low risk” patients
<i>Cognitive Ability</i>	Benjamin, Brown, & Shapiro (2006)	92	Low scorers on standardized mathematics test > high scorers



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1. The first part of the document is a title page. It contains the title of the document, the author's name, and the date of the document.

2. The second part of the document is an abstract. It provides a brief summary of the main points of the document.

3. The third part of the document is an introduction. It provides background information on the topic and states the purpose of the document.

4. The fourth part of the document is the main body. It contains the main text of the document, which is divided into several sections.

5. The fifth part of the document is a conclusion. It summarizes the main findings of the document and provides recommendations.

6. The sixth part of the document is a bibliography. It lists the sources of information used in the document.

7. The seventh part of the document is an appendix. It contains additional information that is related to the main text but is not essential for understanding the main points.

8. The eighth part of the document is a glossary. It defines the key terms used in the document.

9. The ninth part of the document is an index. It provides a list of the main topics and sub-topics in the document, along with the page numbers where they can be found.

10. The tenth part of the document is a list of figures and tables. It provides a list of the figures and tables in the document, along with their captions.

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1. The first step in the process is to identify the problem or goal. This involves understanding the current situation and what needs to be achieved.

2. Once the problem is identified, the next step is to gather information. This can be done through research, interviews, or data analysis.

3. After gathering information, the next step is to analyze the data. This involves looking for patterns, trends, and insights that can help inform the decision-making process.

4. The fourth step is to develop a plan. This involves determining the best course of action to achieve the goal, taking into account the available resources and potential risks.

5. Once a plan is developed, the next step is to implement it. This involves putting the plan into action and monitoring progress along the way.

6. Finally, the last step is to evaluate the results. This involves assessing the outcomes of the process and determining whether the goal has been achieved.

